UNIVERSITY OF JAMMU

(NAAC ACCREDITED A++ GRADE UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)
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NOTIFICATION
(26/June/Adp./19)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Competent Bodies, has been pleased to authorize the adoption of Competency Based Curriculum for governing the degree of **Bachelor of Dialysis Therapy Technology (B.DTT)** as per the National Commission for Allied and Healthcare Professions-2021 from the Academic Session 2026-27 onwards (as given in the Annexure).

Note: The Regulation and Curriculum of the courses is available on the University Website: www.jammuuniversity.ac.in

-SD-
DEAN ACADEMIC AFFAIRS

No. F.Acd/III/26/2151-65
Dated: 03/06/2026

Copy for information & necessary action to:-

1. Principal / Dean Faculty of Medical Science, Govt. Medical College, Jammu.
2. Sr. P.A to the Controller of Examinations.
3. Director CITES&M, **with the request to kindly direct the concerned to upload the same on the University website.**
4. Chairperson, State Allied and Healthcare Council, J&K.
5. Dr. Rachna Sabharwal, I/c Academic, B.Sc. Allied and Healthcare courses, GMC, Jammu.
6. Principals of all concerned Colleges.
7. Joint Registrar / Deputy Registrar (Exams Prof./Eval. Prof./ Confidential)

26/6/26

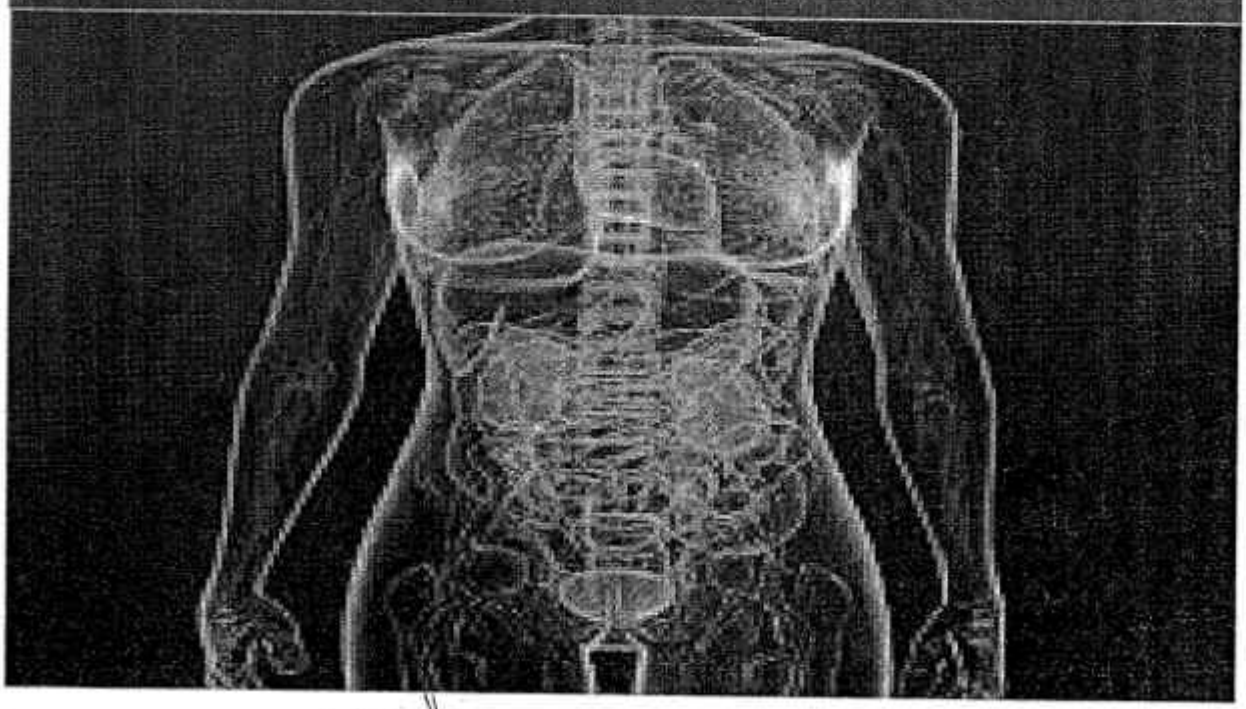
Joint Registrar (Academic)

2/6/26 2/6/2026

सत्यमेव जयते

National Commission for Allied and Healthcare Professions

Curriculum Handbook
DIALYSIS THERAPY TECHNOLOGY & DIALYSIS THERAPY



As per the NCAHP Act-2021

APPROVED SYLLABUS

2025

Ministry of Health & Family Welfare

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List of Abbreviations

AC	Alternating Current
ACLS	Advanced Cardiac Life Support
ADH	Anti-Diuretic Hormone
AED	Automated External Defibrillator
AHPs	Allied and Healthcare Professionals
AKI	Acute Kidney Injury
ALS	Advance Life Support
ANCA	Antineutrophil Cytoplasmic Antibody
ANS	Autonomic Nervous System
AntiGBM	Anti-Glomerular Basement Membrane
APD	Automated Peritoneal Dialysis
ARF	Acute/Advanced Renal Failure
ASO/ASLO	Antistreptolysin O
ATN	Acute Tubular Necrosis
ATP	Adenosine Triphosphate
AVF	Arterio-Venous Fistula
AVG	Arterio-Venous Grafts
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha, Homeopathy
AZA	Azathioprine
BDTT	Bachelors in Dialysis Therapy Technology
BLD	Blood Leak Detector
BLS	Basic life support
BM	Biomedical
BMR	Basal Metabolic Rate
BMW	Bio Medical Waste
BP	Blood Pressure
BT	Bleeding Time
BUN	Blood Urea Nitrogen
BVMs	Bag Valve Masks
BVSC	Bachelor of Veterinary Science
C-ANCA	Cytoplasmic – Antineutrophil Cytoplasmic Antibody
CAPD	Continuous Ambulatory Peritoneal Dialysis
CATS	Credit Accumulation and Transfer System
CAVH	Continuous Arterio-Venous Hemofiltration
CBCS	Choice-Based Credit System
CBD	Case-based discussion
CCPD	Continuous Cycling Peritoneal Dialysis
CEX	Mini Case Evaluation Exercise
CHC	Community Health Centre
CHF	Congestive Heart Failure
CKD	Chronic Kidney Disease

CMV	Cytomegalovirus
CNS	Central Nervous System
CPR	Cardio Pulmonary Resuscitation
CPU	Central Processing Unit
CRF	Chronic Renal Failure
CRP	C-Reactive Protein
CRRT	Continuous Renal Replacement Therapy
CSA	Cyclosporin A
CSF	Cerebro Spinal Fluid
CT	Clotting Time
DC	Direct Current
DT	Dialysis Therapy
DDT	Diploma in Dialysis Technology
DGF	Delayed Graft Function
DH	District Hospital
DNA	Deoxyribonucleic Acid
DOPs	Direct observation of procedures
DSA	Donor Specific Antibodies
DTT	Dialysis Therapy Technology
EBV	Epstein-Barr virus
ECG	Electrocardiogram
ECTS	European Credit Transfer System
EEG	Electroencephalogram
ELISA	Enzyme-Linked Immuno Sorbent Assay
EMG	Electromyogram
EMR	Electronic Medical Records
EMS	Emergency Medical Services
EPROM	Erasable Programmable Read Only Memory
ESR	Erythrocyte Sedimentation Rate
ESRD	End Stage Renal Disease
FISH	Fluorescence In Situ Hybridization
G	Gravity
GFR	Glomerular Filtration Rate
GIT	Gastro-Intestinal Tract
H & E Staining	Hematoxylin and Eosin Staining
Hb	Hemoglobin
HBsAg	Hepatitis B Surface Antigen (or protein)
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
HLA	Human Leukocyte Antigen
HLS	Histocompatibility

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HoD	Head of Department
HRQOL	Health-Related Quality Of Life
HSSC	Healthcare Sector Skill Council
ICAHP	Interim Commission for Allied and Healthcare Professions
ICT	Information and Communications Technology
ICU	Intensive Care Unit
IgA	Immunoglobulin A
IgD	Immunoglobulin D
IgE	Immunoglobulin E
IgG	Immunoglobulin G
IgM	Immunoglobulin M
ISO	International Organization for Standardization
IV	Intravenous
IVP	Intra Venous Pyelogram
JCI	Joint Commission International
JD	Job description
JG	Juxtaglomerular
K	Clearance
KoA	Mass Transfer Coefficient
KT/V	Number used to quantify hemodialysis and peritoneal dialysis treatment adequacy, where K - dialyzer clearance of urea, t - dialysis time and V - volume of distribution of urea, approximately equal to patient's total body water
KuF	Ultrafiltration Coefficient
L J media	Löwenstein–Jensen medium
L.S.	Longitudinal Section
LAN	Local Area Network
LD	Level Detector
LF	Lactose Fermenting
LMWH	Low Molecular Weight Heparin
LS	Longitudinal Section
M.Sc.	Master of Science
MDT	Master in Dialysis Therapy
MAb	Monoclonal Antibody
MAN	Metropolitan area network
MARS	Molecular Adsorbent Recirculating System
MCH	Mean Cell Haemoglobin
MCHC	Mean Corpuscular Hemoglobin Concentration
MCV	Mean Cell (or Corpuscular) Volume
ME	Microscopic Examination
MHC	Major Histocompatibility Complex
MLC	Medico legal case
MoHFW	Ministry of Health and Family Welfare
MoU	Memorandum of Understanding

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MS	Microsoft
NA	Nutrient Agar
NABH	National Accreditation Board for Hospitals & Healthcare Providers
NCAHP	National Commission for Allied and Healthcare Professionals
NIPD	Nocturnal Intermittent Peritoneal Dialysis
NK cell	Natural Killer cell
NLF	Non-Lactose Fermenting
NMJ	Neuromuscular Junction
OSCE	Objective Structured Clinical Examination
OSLER	Objective Structured Long Examination Record
OSPE	Objective Structured Practical Examination
OT	Operation Theatre
P-ANCA	Perinuclear – Antineutrophil Cytoplasmic Antibody
PAOP	Pulmonary Artery Occlusion Pressure
PCM/B	Physics, Chemistry, Maths/ Biology
PCR	Polymerase Chain Reaction
PCTs	Patient Care Technologists
PCV	Packed Cell Volume
PD	Peritoneal Dialysis
PEA	Pulseless Electrical Activity
PET	Peritoneal Equilibrium/Equilibration Test
PG	Post Graduate
Ph.D.	Doctor of Philosophy
Ph.D. D.T	Doctor of Philosophy Dialysis Therapy
PHC	Primary Health Centre
PPE	Personal Protective Equipment
PRA	Panel Reactive Antibodies
PT	Prothrombin Time
PTH	Para-Thyroid Hormone
PTT	Partial Thromboplastin Time
RAM	Random Access Memory
RBC	Red Blood Cells
RDA	Recommended Dietary Allowances
RF	Rheumatoid Factor
RNA	Ribonucleic Acid
RO	Reverse Osmosis
ROM	Read-Only Memory
RPM	Revolutions Per Minute
RQ	Respiratory Quotient
RS	Respiratory System
SC/ST/OBC	Schedules Castes/ Scheduled Tribes/ Other Backward Classes
SCA	Sudden Cardiac Arrest

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SCUF	Slow Continuous Ultrafiltration
SDA	Specific Dynamic Action
SDH	Sub District Hospital
SI	System International
SLED	Slow Low Efficiency Dialysis/Sustained Low-Efficiency Dialysis
T.S.	Transverse Section
TIBC	Total Iron Binding Capacity
TmG	Transport maximum for Glucose
TMP	Trans Membrane Pressure
TNF	Tumor Necrosis Factor
TS	Transverse Section
TSC	Technical safety checks
UF	Ultrafiltration
UGC	University Grants Commission
UHC	Universal Health Care
UTI	Urinary Tract Infection
UV	Ultra-Violet
VDE test	Verband der Elektrotechnik
VDRL	Venereal Disease Research Laboratory
VF	Ventricular Fibrillation
VT	Ventricular Tachycardia
WAN	Wide area network
WBC	White Blood Cells
WWW	World Wide Web

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Chapter 1

Introduction to the Handbook

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Chapter 1: Introduction to the Handbook

The National Dialysis Therapy Technology & Dialysis Therapy Curriculum Handbook represents an updated and revised version of the Model Curriculum Handbook on Dialysis Therapy Technology initially issued by the Allied Health Section of the Ministry of Health and Family Welfare, Government of India, in 2016. Following the passage of the National Commission for Allied and Health Care Professions Act on March 28, 2021 in the Parliament of India the Interim Commission for Allied and Health Care Professions was established to oversee the implementation of the National Commission for Allied Health Care Profession Act.

The commission was established with the aim of regulating and upholding standards of education and services within allied and healthcare professions. This includes the assessment of institutions, maintenance of Central and State Registers, and the establishment of systems to enhance access, research, development, and the adoption of the latest scientific advancements within the field. As part of its mandate, the commission initiated the process of drafting standardized curricula for dialysis therapy education across the nation.

The National Dialysis Therapy Technology & Dialysis Therapy Curriculum Handbook serves as a comprehensive resource designed to acquaint universities, colleges, healthcare providers, and educators offering allied and healthcare courses with these national standards. Tailored for various professional groups within allied and healthcare professions, this handbook aims to minimize educational discrepancies by introducing standardized curricula, career pathways, nomenclature, and other relevant details for dialysis therapy profession.

Moving away from a purely didactic approach, the adoption of standardized curricula is anticipated to cultivate more proficient professionals, thereby enhancing the overall quality of patient care. In alignment with the recommendations of the NCAHP Act, this handbook aims to equip professionals with the necessary skills and knowledge to deliver high-quality dialysis care and optimize patient outcomes and also serves as a valuable guide for the multitude of young adults aspiring to pursue careers in healthcare, guiding them towards the appropriate educational pathways to become skilled and competent Dialysis professionals of the future.

Who is an Allied and Healthcare Professional?

The National commission for allied and health care professions act defines the Allied & healthcare professionals as:

Allied and Healthcare Professional:

Allied and healthcare professionals (AHPs) perform any technical and practical task to support diagnosis and treatment of illness, disease, injury or impairment, and to support implementation of any healthcare treatment and referral plan recommended by a medical, nursing or any other healthcare professional, and who has obtained any qualification of diploma or degree under this Act, the duration of which shall not be less than two thousand hours spread over a period of two years to four years divided into specific semesters.

Healthcare Professionals:

Healthcare Professional includes a scientist, therapist or other professional who studies, advises, researches, supervises or provides preventive, curative, rehabilitative, therapeutic or promotional health services and who has obtained any qualification of degree under this Act, the duration of which shall not be less than three thousand six hundred hours spread over a period of three years to six years divided into specific semesters

Scope and need for Dialysis Therapy Technology & Dialysis Therapy Professionals in the Indian healthcare system

Medical Technology in Indian health care setting

In recent decades, significant strides in medical technology have greatly enhanced the quality of healthcare, yet these advancements have also ushered in new complexities. It is now widely acknowledged that effective healthcare delivery is a collaborative effort involving a diverse array of professionals, both clinical and non-clinical, rather than solely relying on physicians and nurses. The demand for professionals capable of independently managing healthcare services using advanced machinery and protocols has surged. With diagnosis and treatment increasingly reliant on technology, the role of healthcare professionals has become indispensable in ensuring successful healthcare delivery.

As the Indian government strives for Universal Health Coverage, the scarcity of skilled human resources emerges as a formidable obstacle. Despite a growing body of evidence demonstrating the benefits of a diverse healthcare workforce, ranging from improved access to services to substantial reductions in healthcare costs, India's healthcare system remains largely entrenched in a doctor-centric model. Moreover, the privatization of healthcare has exacerbated the financial burden on the population, leading to a steady rise in out-of-pocket expenses.

Addressing these challenges requires a paradigm shift towards a more collaborative and inclusive healthcare approach. Investing in the recruitment and training of a diverse range of healthcare professionals, including technologists, therapists, and other allied healthcare workers, is essential for meeting the evolving needs of the population. By leveraging the expertise of these professionals, healthcare systems can enhance efficiency, expand access to services, and improve overall health outcomes.

Furthermore, fostering interdisciplinary collaboration among healthcare professionals is crucial for maximizing the impact of technological advancements in healthcare delivery. By working together seamlessly, clinicians and non-clinicians can harness the full potential of innovative technologies to provide holistic and patient-centered care.

Medical technology has revolutionized healthcare delivery; it has also underscored the importance of a diverse and skilled healthcare workforce. Embracing a team-based approach and investing in the development of healthcare professionals are critical steps towards achieving Universal Health Coverage and ensuring equitable access to high-quality healthcare for all segments of society.

Dialysis Therapy Technologist & Dialysis Therapists:

The scope and necessity for Dialysis Therapy Technologists and Dialysis Therapists in the Indian healthcare system are profound and multifaceted, reflecting the evolving landscape of healthcare delivery and the growing demand for specialized care in renal health.

With only approximately 2600 nephrologists in India, which translates to merely 1.9 per million population[37], there exists a significant gap in addressing the burgeoning need for renal health services in the country. This scarcity of nephrologists poses a formidable challenge in providing adequate care and support to the growing number of individuals affected by renal conditions, including chronic kidney disease (CKD) and end-stage renal disease (ESRD).[38]

The limited number of nephrologists underscores the urgent need to explore alternative approaches to deliver renal health services effectively. One viable solution is to enhance the role and utilization of other healthcare professionals, such as Dialysis Therapy Technologists and Dialysis Therapists, who specialize in administering dialysis treatments and providing comprehensive care to patients with kidney failure.

By leveraging the expertise of Dialysis Therapy Technologists and Dialysis Therapists, healthcare facilities can expand access to dialysis services and alleviate the burden on nephrologists. These skilled professionals are well-equipped to manage dialysis procedures, monitor patient vitals, and provide education and support to patients undergoing treatment.

Furthermore, investing in the training and deployment of Dialysis Therapy Technologists and Dialysis Therapists can help bridge the gap in renal health services and ensure that patients receive timely and high-quality dialysis care. Their specialized knowledge and proficiency in dialysis therapy make them invaluable assets in addressing the growing demand for renal health services in India.

With the rising incidence of chronic kidney disease (CKD) and end-stage renal disease (ESRD) in India, there is an urgent need to expand access to high-quality dialysis services. Dialysis Therapy Technologists and Dialysis Therapists play a critical role in meeting this demand by providing skilled care and expertise in administering dialysis treatments.

One key aspect of their scope involves the proficient management of various dialysis modalities, including hemodialysis and peritoneal dialysis. These professionals are adept at operating sophisticated dialysis equipment, monitoring patient vitals, and ensuring the safe and effective delivery of treatment.

Beyond technical proficiency, Dialysis Therapy Technologists and Dialysis Therapists also contribute to enhancing patient care and outcomes through education and support. They play a vital role in educating patients about their condition, treatment options, and self-care strategies, empowering them to actively participate in their healthcare journey.

Moreover, Dialysis Therapy Technologists and Dialysis Therapists collaborate closely with multidisciplinary healthcare teams to develop and implement individualized treatment plans for

patients undergoing dialysis/ extracorporeal therapies in various settings. Their interdisciplinary approach ensures holistic care and seamless coordination across healthcare settings.

In critical care scenarios, such as intensive care units (ICUs) or during organ transplantation, Dialysis Therapy Technologists and Dialysis Therapists play an indispensable role in managing complex dialysis / extracorporeal procedures and optimizing outcomes for critically ill patients.

Additionally, these professionals contribute to quality improvement initiatives aimed at enhancing patient outcomes and satisfaction. By staying abreast of the latest advancements in dialysis technology and best practices, they ensure that patients receive the highest standard of care.

Dialysis Therapy Technologists and Dialysis Therapists are indispensable members of the healthcare workforce in India, addressing the growing demand for specialized renal care services. Their expertise, dedication, and collaborative approach play a vital role in improving patient outcomes and advancing healthcare delivery in the realm of dialysis therapy. As India continues to confront the challenges posed by kidney disease, investing in the recruitment, training, and deployment of these skilled professionals is essential for ensuring equitable access to high-quality dialysis care for all segments of society.[40]

Learning goals and objectives for Dialysis Therapy Technology & Dialysis Therapy professionals

The handbook is structured to emphasize performance-based outcomes at various educational levels. Both undergraduate and postgraduate programs will define their learning goals and objectives based on expected performance levels. These goals will clarify the purpose of teaching each concept (learning goals) and what students are expected to achieve (learning objectives). Through this framework, students will develop the ability to apply their knowledge, skills, and competencies in practical settings within the healthcare field. These learning objectives are categorized into nine key areas, with the level of participation varying depending on the qualification level and professional roles.

1. Clinical care
2. Communication
3. Membership of a multidisciplinary health team
4. Ethics and accountability at all levels (clinical, professional, personal and social)
5. Commitment to professional excellence
6. Leadership and mentorship
7. Social accountability and responsibility
8. Scientific attitude and scholarship (only at higher level- PhD)
9. Lifelong learning

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1. Clinical Care[4]

Using a patient/family-centered approach and best evidence, each student will organize and implement the prescribed preventive, investigative and management plans; and will offer appropriate follow-up services. Program objectives should enable the students to:

- Apply the principles of basic science and evidence-based practice
- Use relevant investigations as needed
- Identify the indications for basic procedures and perform them in an appropriate manner
- Provide care to patients – efficiently and in a cost-effective way – in a range of settings, and maintain foremost the interests of individual patients
- Identify the influence of biological, psychosocial, economic, and spiritual factors on patients' well-being and act in an appropriate manner
- Incorporate strategies for health promotion and disease prevention with their patients

2. Communication[4,5]

The student will learn how to communicate with patients/clients, care-givers, other health professionals and other members of the community effectively and appropriately. Communication is a fundamental requirement in the provision of health care services. Program objectives should enable the students to:

- Provide sufficient information to ensure that the patient/client can participate as actively as possible and respond appropriately to the information
- Clearly discuss the diagnosis and options with the patient, and negotiate appropriate treatment plans in a sensitive manner that is in the patient's and society's best interests
- Explain the proposed healthcare service – its nature, purpose, possible positive and adverse consequences, its limitations, and reasonable alternatives wherever they exist
- Use effective communication skills to gather data and share information including attentive listening, open-ended inquiry, empathy and clarification to ensure understanding
- Appropriately communicate with, and provide relevant information to, other stakeholders including members of the healthcare team
- Use communication effectively and flexibly in a manner that is appropriate for the reader or listener
- Explore and consider the influence that the patient's ideas, beliefs and expectations have during interactions with them, along with varying factors such as age, ethnicity, culture and socioeconomic background
- Develop efficient techniques for all forms of written and verbal communication including accurate and timely record keeping
- Assess their own communication skills, develop self-awareness and be able to improve their relationships with others
- Possess skills to counsel for lifestyle changes and advocate health promotion

3. Membership of a multidisciplinary health team[6]

The student will put a high value on effective communication within the team, including transparency about aims, decisions, uncertainty and mistakes. Team-based health care is the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively to accomplish shared goals within and across settings to achieve coordinated, high quality care. Program objectives will aim at making the students being able to:

- Recognize, clearly articulate, understand and support shared goals in the team that reflect patient and family priorities
- Possess distinct roles within the team; to have clear expectations for each member's functions, responsibilities, and accountabilities, which in turn optimizes the team's efficiency and makes it possible for them to use division of labor advantageously, and accomplish more than the sum of its parts
- Develop mutual trust within the team to create strong norms of reciprocity and greater opportunities for shared achievement
- Communicate effectively so that the team prioritizes and continuously refines its communication channels creating an environment of general and specific understanding
- Recognize measurable processes and outcomes, so that the individual and team can agree on and implement reliable and timely feedback on successes and failures in both the team's functioning and the achievement of their goals. These can then be used to track and improve performance immediately and over time.

4. Ethics and accountability

Students will understand core concepts of clinical ethics and law so that they may apply these to their practice as healthcare service providers. Program objectives should enable the students to:

- Describe and apply the basic concepts of clinical ethics to actual cases and situations
- Recognize the need to make health care resources available to patients fairly, equitably and without bias, discrimination or undue influence
- Demonstrate an understanding and application of basic legal concepts to the practice
- Employ professional accountability for the initiation, maintenance and termination of patient-provider relationships
- Demonstrate respect for each patient's individual rights of autonomy, privacy, and confidentiality

5. Commitment to professional excellence[7]

The student will execute professionalism to reflect in his/her thought and action a range of attributes and characteristics that include technical competence, appearance, image, confidence level, empathy, compassion, understanding, patience, manners, verbal and non-verbal communication, an anti-discriminatory and non-judgmental attitude, and appropriate physical contact to ensure safe, effective and expected delivery of healthcare. Program objectives will aim at making the students being able to:

- Demonstrate distinctive, meritorious and high quality practice that leads to excellence and that depicts commitment to competence, standards, ethical principles and values, within the legal boundaries of practice
- Demonstrate the quality of being answerable for all actions and omissions to all, including service users, peers, employers, standard-setting/regulatory bodies or oneself
- Demonstrate humanity in the course of everyday practice by virtue of having respect (and dignity), compassion, empathy, honour and integrity
- Ensure that self-interest does not influence actions or omissions, and demonstrate regards for service-users and colleagues

6. Leadership and mentorship[8]

The student must take on a leadership role where needed in order to ensure clinical productivity and patient satisfaction. They must be able to respond in an autonomous and confident manner to planned and uncertain situations, and should be able to manage themselves and others effectively. They must create and maximize opportunities for the improvement of the health seeking experience and delivery of healthcare services. Program objectives should enable the students to:

- Act as agents of change and be leaders in quality improvement and service development, so that they contribute and enhance people's wellbeing and their healthcare experience
- Systematically evaluate care; ensure the use of these findings to help improve people's experience and care outcomes, and to shape clinical treatment protocols and services
- Identify priorities and effectively manage time and resources to ensure the maintenance or enhancement of the quality of care
- Recognize and be self-aware of the effect their own values, principles and assumptions may have on their practice. They must take charge of their own personal and professional development and should learn from experience (through supervision, feedback, reflection and evaluation)
- Facilitate themselves and others in the development of their competence, by using a range of professional and personal development skills

- Work independently and in teams. They must be able to take a leadership role to coordinate, delegate and supervise care safely, manage risk and remain accountable for the care given; actively involve and respect others' contributions to integrated person-centered care; yet work in an effective manner across professional and agency boundaries. They must know when and how to communicate with patients and refer them to other professionals and agencies, to respect the choices of service users and others, to promote shared decision-making, to deliver positive outcomes, and to coordinate smooth and effective transition within and between services and agencies.

7. Social Accountability and Responsibility[9]

The students will recognize that allied and healthcare professionals need to be advocates within the health care system, to judiciously manage resources and to acknowledge their social accountability. They have a mandate to serve the community, region and the nation and will hence direct all research and service activities towards addressing their priority health concerns. Program objectives should enable the students to:

- Demonstrate knowledge of the determinants of health at local, regional and national levels and respond to the population needs
- Establish and promote innovative practice patterns by providing evidence-based care and testing new models of practice that will translate the results of research into practice, and thus meet individual and community needs in a more effective manner
- Develop a shared vision of an evolving and sustainable health care system for the future by working in collaboration with and reinforcing partnerships with other stakeholders, including academic health centres, governments, communities, and other relevant professional and non-professional organizations
- Advocate for the services and resources needed for optimal patient care

8. Scientific attitude and Scholarship[10]

The student will utilize sound scientific and/or scholarly principles during interactions with patients and peers, educational endeavors, research activities and in all other aspects of their professional lives. Program objectives should enable the students to:

- Engage in ongoing self-assessment and structure their continuing professional education to address the specific needs of the population
- Practice evidence-based by applying principles of scientific methods
- Take responsibility for their educational experiences
- Acquire basic skills such as presentation skills, giving feedback, patient education and the design and dissemination of research knowledge; for their application to teaching encounters

9. Lifelong learning[11]

The student should be committed to continuous improvement in skills and knowledge while harnessing modern tools and technology. Program objectives will aim at making the students being able to:

- Perform objective self-assessments of their knowledge and skills; learn and refine existing skills; and acquire new skills
- Apply newly gained knowledge or skills to patient care
- Enhance their personal and professional growth and learning by constant introspection and utilizing experiences
- Search (including through electronic means), and critically evaluate medical literature to enable its application to patient care
- Develop a research question and be familiar with basic, clinical and translational research in its application to patient care

  Identify and select an appropriate, professionally rewarding and personally fulfilling career pathway

TEACHING LEARNING METHODOLOGIES

The dialysis curriculum will encompass with courses emphasizing communication, basic clinical skills, and professionalism, with clinical training integrated from the outset in the first year. It is advised that ample clinical exposure be provided at the primary care level, alongside the learning of fundamental and clinical sciences. Furthermore, there will be a strong emphasis on introducing case scenarios for classroom discussion and case-based learning.

In India, the healthcare education sector is integral to the efficiency of the healthcare system, yet it has not fully capitalized on the ongoing international technological revolution. The report 'From Paramedics to Allied Health: Mapping the Journey and Beyond' highlights that clinical skills are typically taught at the patient's bedside or in clinical settings, supplemented by didactic teaching in classrooms and lecture halls. To align with technological advancements and embrace outcome-based education, institutions are transitioning towards more effective assessment methods. However, there is a need to promote the demonstration of competence in institutions where it is currently lacking.

Several allied and healthcare schools in India have established clinical skill centers, laboratories, and high-fidelity simulation labs to enhance training for students and professionals in the field. Simulation, involving the replication of clinical encounters using mannequins, computer-assisted resources, and simulated patients/environment, addresses various challenges such as limited access to resources and equipment, inadequately trained personnel on newer technologies, and limitations in imparting practical training in real-life scenarios. The utilization of simulators also improves skills assessment method. The following table outlines diverse teaching and learning methodologies that leverage advanced tools and technologies:

Table 1 Clinical learning opportunities imparted through the use of advanced techniques[1,20]

Teaching modality	Learning opportunity examples
Patients	Teach and assess in selected clinical scenarios
	Practice soft skills
	Practice physical examination
	Receive feedback on performance
Mannequins	Perform acquired techniques
	Practice basic procedural skills
	Apply basic science understanding to clinical problem solving
Simulators	Practice teamwork and leadership
	Perform cardiac and pulmonary care skills
	Apply basic science understanding to clinical problem solving
Task under trainers	Monitor and terminate dialysis treatment, etc.

Assessment methods

In the context of a dialysis curriculum, adopting outcome/competency-based assessment methods proves highly effective for evaluating students' knowledge, skills, and attitude/behavior compared to outcome-based assessments alone. Given their integral role in community health and safety, prioritizing competency-based assessment becomes paramount in this professional course.[32,33] These assessments provide students with invaluable real-world experiences, enabling them to analyze situations, hone communication skills, demonstrate professionalism, engage in problem-solving, and navigate the healthcare system within dynamic clinical contexts [34,35].

The competency-based assessment tools & methods that can be implemented for the students are[36,37].

Domain of learning	Assessment tools
Cognitive	Structured logbook Viva-voce examination Structured case presentation Formative assessment Summative assessment Case presentation
Psychomotor	Objective Structured Clinical Examination (OSCE) Objective Structured Practical Examination (OSPE) Mini Clinical Evaluation Exercise (Mini-CEX) Direct Observation of Procedural Skills (DOPS) Simulation-based assessment
Affective	Professionalism mini-Evaluation Exercise (P-MEX) Multi-source Feedback Mini Peer-assessment tool (Mini-PAT)

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Chapter 2
Methodology of Curriculum Development

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Chapter 2: Methodology of curriculum development

The Interim Commission for Allied and Healthcare Professions, recognizing the critical need for standardization across education, practice, and development within allied and healthcare professions, established three committees to address these crucial aspects. Committee 3 was specifically tasked with the essential responsibility of standardizing the curriculum for the Allied and Healthcare professions.

In pursuit of this objective, the Ministry of Health and Family Welfare already took a proactive step by developing and publishing a model curriculum handbook for Dialysis Therapy Technology during the period of 2015-16. This handbook served as a foundational document aimed at ensuring uniformity in the curriculum for diploma, undergraduate, and postgraduate education in Dialysis across India.

Recognizing the dynamic nature of healthcare and technological advancements, as well as the evolving global landscape, efforts were made to continually upgrade and revise the curriculum. This iterative process aimed to align with national and international standards in the field of dialysis education, ensuring that professionals in India are equipped with the latest knowledge and skills.

To achieve this, the commission engaged the expertise of professionals in academia, practice, and research from esteemed government and private institutions nationwide. These experts were instrumental in constituting a task force committee specifically focused on Dialysis Therapy. Leveraging their collective knowledge and experience, they meticulously redesigned the curricula based on a standardized framework, ensuring relevance and effectiveness.

Guided by the commission's directives, the task force committee diligently worked to revise and recommend updated guidelines regarding the education and practice of dialysis in India. This collaborative effort aimed to enhance the quality and availability of dialysis therapy technologists and therapists in alignment with international standards and guidelines, thereby meeting the growing demands of the healthcare sector. The curriculum was developed in accordance to the guidelines framed by the Interim Commission for Allied and Healthcare Professions and guiding principles for the curriculum development is mentioned below.

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Sl. No	Thematic issues/areas of deliberation	Consensus of the group on guiding principles
1.	**Scope of Curriculum**	**Minimum curricula guidelines** are to be designed for each level of the program for each profession. • Curricula should be patient-centric and futuristic. • Must include the latest advancement in technology. • Should be aligned with global standards and allow global mobility
2.	**Mode of education for all allied and healthcare program**	**All programs should be delivered in full-time mode** and no institution should deliver any part-time or distance program in the allied and healthcare sciences.
3.	**Components of the curriculum**	**Curricula must consider:** • Definition of the profession • Entry criteria to the profession • Entry qualification to the profession- Diploma/ Bachelor level and levels of program desired in the profession other than entry qualification • Nomenclature of the qualifications • Duration of each level of the program with the duration of the internship. • Must-have competencies at the end of each level and competencies must drive the curriculum content. • Program evaluation framework/ assessment at the end of each program • Number of desired faculty (with hierarchy/ designation) and defined minimum qualifications for each level of the program • Batch size and student and faculty ratios • Details of reference books, journals and desirable and essential equipment must also be considered.
4.	**Alignment with choice-based credit system (CBCS) encouraging multiple entries and multiple exits under the National Education Policy framework.**	**A pre-determined credit-based system is to be followed for all the allied and healthcare programs** that ensure a basic minimum competency in essential subjects: • **Credits and the number of hours** must be allocated to each subject. • While lateral entry and bridge programs can be devised for existing professionals for entry, multiple exits may not be implemented.

Sl. No	Thematic issues/areas of deliberation	Consensus of the group on guiding principles
5.	Entrance mechanism and entry criteria	Common entrance mechanism to be considered for all programs: • **Universities can consider NEET appeared candidates** along with **50% in 10+2 science** (Biology and/or Mathematics as per the requirement of the professions) or **University/State entrance examination** for admissions in the allied and healthcare programs. • **Remedial Biology/ Mathematics is to be considered if knowledge is desired in the domain** and the entry criteria allow students without qualifying the same subjects in 10+2.
6.	Medium of instruction	**The medium of teaching should be 'English'** • Students from other boards without English as a compulsory subject may be encouraged to pick English as an elective from available resources on Swayam and similar platforms. • The completion of the course will not lead to any university course credit (non-university course).
7.	Desired competencies and skills	**Competency framework** (including performance criteria and related knowledge, skill and behaviours) to be included in each level of the program. • **Competencies should be measurable and aligned with assessments.** • **Foundations Courses** – may be spread across the length of the program and weightage to the content/ number of hours/ credits may vary as per the requirement of individual professions. • Soft skills and communication to be focused.
8.	Common pre-clinical and para-clinical subjects	• **All curricula MUST have fundamental subjects for the course to have in-depth knowledge of the basics.** • **Common pre-clinical subjects and para-clinical subjects** applicable to the program should be reviewed and considered in the first two years of the program. Content depth and weightage may however differ by program.

Sl. No	Thematic issues/areas of deliberation	Consensus of the group on guiding principles
9.	Levels and length of the program	**Duration of a program may vary across different programs;** however, the minimum duration should be: • **Diploma should be at least 2.5 years** including 6 months of internship • **Bachelor-level program should be at least 4 years** (including internship) • **Masters level program should be of at least 2 years** focused on specialization in the field **The majority of the taskforce groups agreed to phase out Diploma programs in the timeframe of 5 years and introduce bridge program/ lateral entry pathways to upgrade the existing diploma holders, where applicable.**
10.	Semester versus Annual system	**The curriculum is to be devised in a semester system,** • However, implementation flexibility for semester/annual assessments will be with the institutions and universities. • In case a program is suggested for an annual examination, a compatibility table must be included in the curriculum.
11.	Internships and practical exposure to the students	**All programs must have a mandatory internship** • The length of the internship will be determined by the extent of competencies to be attained by the candidate after the program. • Clinical programs can also mandate **rotatory internships** to increase the level of clinical exposure to the students • **Teaching institutions should be accountable for ensuring the internship of the students in the affiliated hospital,** as it is part of the academic program. o **Standalone institutions** must have an MoU with either a medical college or hospital or healthcare facility as per the guidelines (desired number of beds/ OPD etc.) defined in the curriculum to ensure practical exposure to the students.

Sl. No	Thematic issues/areas of deliberation	Consensus of the group on guiding principles
		○ MoU to also define the clinical supervision of the students -institutional staff or clinical preceptors can be considered. • **Stipends of reasonable amount must be paid for internships.** • Internships cannot be reflected as work experience as those are part of the academic program. • **Studentship or observership** must also be inbuilt into the curriculum. ○ Simulation and skill labs can be used for practicing skills specific to the program if available in the initial years of observership/ studentship. ○ Some hours in every semester can be considered for seminars/workshops on new developments/ technologies. • If the clinical facility is not within the same campus, transportation should be provided to the students and interns. • All practical skills must be supervised and recorded in a digital **Logbook and skills to be evaluated after the completion of the internship.**
12.	**Focus of Master's program and faculty development**	• Masters' programs should be promoted to develop specialization in the field and generate trained faculty in the field • All Master programs must focus on research and engage with industry partners to promote innovation and development in the field • Industry experts can be engaged as guest faculty/ conduct seminars under the framework of programs.
13.	**Exit Examination**	It was agreed upon that an exit examination (including testing of skills and competencies) can be potentially conducted by a third-party agency or organization as eventually identified by the ICAHP/ NCAHP. This can also evolve as a licensure examination for all allied and healthcare professionals.

The development of the Dialysis Therapy Technology & Dialysis Therapy curriculum was a meticulous and collaborative effort, involving more than 34 meetings within the task force of experts and with ICAHP/NCAHP members. This comprehensive endeavor aimed to establish a standardized educational framework for Diploma, Undergraduate, and Postgraduate programs nationwide, drawing upon curricula from various universities and institutions across India.

Extensive research was conducted through a comprehensive literature review, which served as the foundation for crafting the curriculum. The process included the integration of competency/outcome and skills-based models,. both nationally and internationally recognized, along with the exploration of various methodologies for curriculum development and assessment protocols.

Throughout the development process, there was a concerted effort to foster consensus among task force committee members, leveraging their diverse expertise and experiences in their respective fields. Each suggestion was carefully evaluated, with decisions made collaboratively to ensure the applicability and effectiveness of the curriculum.

Following the submission of the initial curriculum to the Ministry, it was opened to public feedback, demonstrating a commitment to transparency and inclusivity. Task force member's dedicated significant time and effort to review and address the feedback received, engaging in thorough deliberation on each aspect. After rigorous examination and discussion, the revised curriculum was formulated to align with the needs of the healthcare system, thereby establishing a standardized framework for Dialysis education in India.

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Chapter 3
Background of the profession

Chapter 3: Background of the profession

Statement of Philosophy– Why Dialysis profession holds so much importance?

The profession of dialysis holds significant importance because it directly impacts the quality of life and survival of individuals with kidney failure. Dialysis is a life-sustaining treatment for people whose kidneys can no longer perform their essential functions of removing waste and excess fluid from the body. Without dialysis, these individuals would face severe health complications and eventual death due to the buildup of toxins and fluid in their bodies.

Dialysis professionals play critical roles in ensuring that patients receive the necessary dialysis treatments safely and effectively. They monitor patients' vital signs, adjust treatment parameters, administer medications, and provide education and support to help patients manage their condition. Moreover, dialysis professionals often develop close relationships with their patients, providing emotional support and encouragement throughout their treatment journey. This holistic approach to care is vital for addressing the physical, emotional, and psychological needs of individuals undergoing dialysis.

Moreover, dialysis professional play an important role in educating dialysis patients. Health literacy is particularly important for kidney patients undergoing dialysis. They must attend treatment sessions several days a week, follow dietary and fluid restrictions, and adhere to complex medication regimens, all of which require patients to understand and act on complicated health-related information.[22,23,24,25,26]

About Dialysis Therapy Technology & Dialysis Therapy

Dialysis is intended to keep the body running as normal as possible while the kidneys are under repair or while a person waits for a kidney transplant. Without working kidneys or dialysis, salts and other waste products would accumulate in the blood and poison the person. Typical haemodialysis treatments (using an artificial kidney) last about four hours and are needed about three times a week.

Dialysis therapy technology has undergone significant advancements over the years, revolutionizing the treatment of kidney failure and improving the quality of life for patients worldwide. Dialysis therapy itself encompasses various modalities designed to replicate the functions of healthy kidneys, primarily removing waste products and excess fluids from the bloodstream.

One of the most common forms of dialysis is hemodialysis, where blood is circulated outside the body through a dialysis machine. Within the machine, the blood passes through a specialized filter called a dialyzer, which removes waste and excess fluid before returning the purified blood to the body. Hemodialysis machines have evolved to become more efficient, compact, and user-friendly, incorporating features such as automated monitoring systems, touchscreen interfaces, and connectivity for remote monitoring by healthcare providers.

Peritoneal dialysis is another modality that utilizes the lining of the abdominal cavity, called the peritoneum, as a natural filter. A sterile solution, known as dialysate, is introduced into the abdominal cavity through a catheter. Waste products and excess fluid from the bloodstream pass into the dialysate solution, which is then drained out of the body. Peritoneal dialysis technology has seen advancements in the design of catheters, dialysate solutions, and automated cycling machines, making home-based therapy more convenient and accessible for patients.

In recent years, there has been growing interest in wearable and portable dialysis devices, aiming to provide greater flexibility and mobility to patients. These devices aim to miniaturize dialysis technology, allowing patients to undergo treatment while going about their daily activities. Wearable dialysis devices often utilize innovative filtration methods and compact design to achieve portability without compromising treatment efficacy.

Additionally, there have been developments in the field of bioartificial kidneys, which aim to mimic the functions of natural kidneys more closely. These devices incorporate living cells and biomimetic materials to enhance toxin removal and promote better fluid balance. While still in the experimental stage, bioartificial kidneys hold promise for providing more physiological and sustainable long-term treatment options for patients with kidney failure.

As medical technology advances, newer extracorporeal therapies are emerging to address a broader range of medical conditions and improve patient outcomes. Dialysis professionals, play a crucial role in the delivery of these therapies.

Continuous Renal Replacement Therapy (CRRT): CRRT is a form of dialysis used in critically ill patients with acute kidney injury (AKI) or acute-on-chronic kidney disease. Unlike conventional hemodialysis, CRRT provides continuous removal of waste products and excess fluids over an extended period, typically 24 hours a day. Dialysis professionals are responsible for initiating and monitoring CRRT treatments, adjusting parameters based on patients' clinical status, and managing complications such as hypotension and electrolyte imbalances.

Plasmapheresis: Plasmapheresis, also known as therapeutic plasma exchange, is a procedure used to remove harmful substances from the blood, such as antibodies, toxins, or inflammatory mediators. It is indicated in autoimmune diseases, neurological disorders, and certain toxicological emergencies. Dialysis professionals are involved in performing plasmapheresis treatments, ensuring proper catheter placement, monitoring patients' hemodynamic status, and managing adverse reactions.

Extracorporeal Membrane Oxygenation (ECMO): ECMO is a life support technique used in patients with severe respiratory or cardiac failure. It involves circulating the patient's blood through an artificial membrane oxygenator, which adds oxygen and removes carbon dioxide before returning the blood to the body. Dialysis professionals may be involved in managing patients on ECMO along with renal replacement therapy, monitoring circuit function, troubleshooting complications, and providing comprehensive care in collaboration with the ECMO team.

Liver Support Systems: Extracorporeal liver support systems, such as molecular adsorbent recirculating system (MARS) and single-pass albumin dialysis (SPAD), PROMETHEUS system are used in patients with acute liver failure or acute-on-chronic liver disease to remove toxins and metabolic waste products from the bloodstream. Dialysis professionals play vital role in the setup and operation of these systems, monitor patients' clinical response, and provide supportive care during treatment.

Hemoadsorption: Hemoadsorption is a technique used to remove inflammatory cytokines and other circulating toxins from the bloodstream in patients with septic shock or systemic inflammatory response syndrome (SIRS). Dialysis professionals involved in administering hemoadsorption treatments, monitoring patients' hemodynamic stability, and optimizing therapy based on clinical parameters.

Overall, dialysis therapy technology continues to evolve, dialysis professionals play a critical role in the delivery of newer extracorporeal therapies, providing comprehensive care to patients with a wide range of medical conditions. These innovations not only improve the effectiveness and efficiency of dialysis treatment but also strive to enhance patient comfort, autonomy, and overall quality of life. As technology continues to progress, the future of dialysis therapy holds the potential for even greater improvements in patient outcomes and healthcare delivery.

Scope of Practice for Dialysis Professionals

Dialysis therapy stands as a cornerstone in the treatment of individuals grappling with kidney failure or renal insufficiency. Central to this life-saving procedure are Dialysis Therapists, whose multifaceted roles encompass not only the technical aspects of dialysis but also the holistic care and support vital for patients undergoing this demanding treatment. Dialysis Therapists /Dialysis therapy technologist have extensive scope of practice for, elucidating their pivotal contributions to the well-being of patients battling end-stage renal disease. The collaborative efforts of Dialysis Care Associates, Dialysis Therapy Technologists, Dialysis Therapist and Auxiliary Personnel in ensuring the seamless delivery of dialysis care.

Patient Assessment, Diagnosis and Treatment Planning:

At the heart of every dialysis journey lies a thorough patient assessment conducted by Dialysis Professionals. These assessments, encompassing meticulous reviews of medical history, comprehensive physical examinations, and vigilant monitoring of vital signs, serve as the foundational step in charting the optimal course of dialysis treatment for each individual. Collaborating closely with nephrologists, nurses, and other healthcare professionals, DTTs/DTs craft personalized treatment plans tailored to the unique needs of each patient, meticulously delineating the frequency, duration, and modality of dialysis sessions. Coordinate the diagnosis and management of acute and chronic kidney diseases, electrolyte disorders, hypertension, and related conditions. Order and interpret diagnostic tests, including urine analysis, blood tests (e.g., serum Creatinine, electrolytes), imaging studies (e.g., ultrasound, CT , MRI scans), and kidney biopsies as directed by the nephrologist. Participate in the development of individualized treatment plans, including pharmacological interventions, dietary modifications, lifestyle counselling, and referral to other specialists or healthcare providers as needed.

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Extracorporeal Procedure Execution:

Dialysis professionals are proficient in setting up and operating and managing extracorporeal procedures, such as Liver Dialysis, peritoneal dialysis, CRRT, Plasmapheresis, Hemoperfusion, Immunomodulatory therapies and other extracorporeal therapies.

They initiate and monitor extracorporeal procedures, ensuring proper functioning of equipment, optimal fluid removal, and appropriate management of electrolyte imbalances during treatment.

Clinical Procedures and Interventions:

Perform clinical procedures within the scope of practice, such as venipuncture, vascular access Cannulation, bladder catheterization, and basic wound care, as needed for patient evaluation and management. Coordinate specialized procedures, such as kidney biopsies, central venous catheter insertions, and peritoneal dialysis catheter placements, under the supervision of the nephrologist or interventional radiologist.

Fluid Management, Medication Administration and Management:

In the delicate balance of fluid management, DTTs/DTs play a pivotal role, closely monitoring fluid balance during dialysis treatment to avert the perils of fluid overload or dehydration. With keen attention to the patient's fluid status and hemodynamic stability, they adeptly adjust ultrafiltration rates to optimize treatment outcomes. Additionally, administering medications prescribed by nephrologists forms an integral part of the Dialysis Therapist's role, focusing on managing Anemia and mineral bone disorders associated with kidney failure. Monitor medication efficacy, safety, and adherence, and make appropriate adjustments based on patient response and clinical guidelines

Patient Education, Counselling, Emergency Response and Critical Care:

Beyond the confines of the dialysis unit, DTTs/DTs serve as educators and advocates, empowering patients and their families with comprehensive knowledge about kidney disease, dialysis treatment modalities, dietary restrictions, medication management, and lifestyle modifications essential for fostering optimal health and well-being. Moreover, they stand as stalwart guardians in the unpredictable landscape of medical emergencies, trained to respond swiftly and effectively to emergent situations during dialysis treatment. Dialysis professionals are trained to recognize and respond to emergent situations during extracorporeal procedures, such as hypotension, arrhythmias, vascular access complications, or dialysis-related adverse events. They implement appropriate interventions, initiate resuscitative measures if necessary, and coordinate with other healthcare providers to ensure timely and effective management of critical incidents.

Quality Assurance, Safety, and Professional Development:

Adherence to stringent protocols and guidelines underscores the commitment of Dialysis Therapists to upholding the highest standards of quality and safety in dialysis care. From active participation in quality improvement initiatives to vigilant monitoring of equipment functionality and implementation of infection control measures, they leave no stone unturned in their pursuit of excellence. Moreover, ongoing professional development remains a cornerstone of the Dialysis Therapist's journey, ensuring they remain at the vanguard of dialysis therapy and treatment modalities.

Collaborative Efforts and Facility Management:

In tandem with Dialysis Care Associates, Dialysis Therapy Technologists, and Auxiliary Personnel, Dialysis Therapists oversee the supervision and management of dialysis facilities. Together, they ensure the seamless implementation of dialysis prescriptions, perform hemodialysis, manage intra-dialytic complications, and meticulously document patient data. The collaborative efforts of these professionals are instrumental in fostering an environment conducive to optimal patient care and well-being.

Quality Improvement and Research:

Participate in quality improvement initiatives aimed at enhancing the delivery of nephrology care, optimizing clinical outcomes, and ensuring patient safety and satisfaction. Contribute to research projects, clinical trials, and academic activities related to nephrology practice, including data collection, analysis, and dissemination of research findings.

In summary, Dialysis Professionals scope of practice encompasses a diverse array of clinical, diagnostic, therapeutic, educational, and administrative responsibilities aimed at providing high-quality, patient-centered care for individuals with kidney-related conditions. Dialysis Professionals role is integral to the multidisciplinary team approach to nephrology care, and their contributions play a significant role in improving the health outcomes and quality of life of patients with renal diseases.

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Recognition of Title and qualification

In the multidisciplinary team, the Dialysis Therapist/ Dialysis Therapy Technologist assume the responsibility of directly monitoring both the patient care and the dialysis machine throughout the dialysis session.

The recommended title thus stands as

1. **Dialysis Care Associate for Diploma in Dialysis Technology.**
2. **Dialysis Therapy Technologist for Graduate in Dialysis Therapy Technology**
3. **Dialysis Therapist for Postgraduate & Doctorate in Dialysis Therapy.**

It is widely acknowledged that as professionals advance in their careers, their titles may vary and be influenced by the sector and specific role they occupy. To address this, the taskforce has proposed a career progression table aimed at mapping the various titles, career pathways, and advancement opportunities within the field of Dialysis Therapy Technology/Dialysis Therapy across different sectors.

The table below indicates the various channels of career progression in three distinct sectors such as Clinical setting, Academic, Industry and Research & Development.

The level of responsibility will increase as the career progresses. The table indicates the corresponding level of qualification with experience required by the professional to fulfill the requirements of each level. Considering the degree of patient dealing in case of Dialysis Care Associate/Dialysis Therapy Technologist/ Dialysis Therapist and such other professions, government aims to phase out the Diploma and PG Diploma level programs and promote Professional program at Graduate and Postgraduate level.

In the academic front, to work at the position of a Lecturer/Assistant Professor the candidate must attain master degree. At present as there are limited Postgraduate degree seats in Dialysis Therapy, it has been recommended that eventually provisions will be made to provide bridge courses for PG Diploma holders with undergraduate qualification in Dialysis therapy technology for certain number of years to bring them at par with the Postgraduate level program and universities will be promoted to start Postgraduate Program in Dialysis Therapy. The Director of the dialysis (clinical setting) will be the ultimate authority for the dialysis unit/facility management responsibilities. The Career Progression pathway may change according to the prevailing regulations of NCAHP.

Table: Nomenclature based on career progression for Diploma in Dialysis Technology & Bachelors in Dialysis Therapy Technologist.

Nomenclature in various sectors for Diploma & Graduates				Qualification and experience
Clinical	Academic	Industry/ Management	Research	
Dialysis Care Associate	-	-	-	Diploma in Dialysis Technology
• Dialysis Therapy Technologist • Transplant Coordinator • Vascular Access Coordinator	Clinical Instructor	Dialysis Application Specialist	Scientist B	BDTT with 0-4 years' experience post BDTT
• Senior Dialysis Therapy Technologist • Senior Transplant Coordinator • Senior Vascular Access Coordinator	Tutor	Senior Dialysis Application Specialist	Scientist C	BDTT with 4 years' experience post BDTT
• Chief Dialysis Therapy Technologist • Transplant Manager	Lecturer	Lead Dialysis Application Specialist	-	BDTT with 8 years' experience post BDTT
Deputy Manager for Dialysis Unit	-	Regional Dialysis Application Specialist	-	BDTT with 12 years' experience post BDTT
Manager for Dialysis Unit	-	-	-	BDTT with 15 years' experience post BDTT.

Career progression

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Table: Nomenclature based on career progression for Masters in Dialysis Therapy & Doctorate in Dialysis Therapy

Nomenclature in various sectors for Postgraduates & Doctorate				Qualification and experience
Clinical	Academic	Industry/ Management	Research	
• Dialysis Therapist • Nephrology Physician Associate	Lecturer	Dialysis Clinical Therapist	Scientist C	MDT with 0-2 years' experience post MDT
• Senior Dialysis Therapist • Senior Nephrology Physician Associate	Assistant Professor	Lead Dialysis Clinical Therapist	Scientist D	MDT with 02 years post MDT PhD (Desirable)
• Chief Dialysis Therapist • Renal Healthcare Practitioner*	Associate Professor	Deputy Manager Dialysis Therapy	Scientist E	MDT with 08 years post MDT PhD (DT) with 03 years post PhD (DT)
• Manager • Renal Healthcare Specialist*	Professor	Manager Dialysis Therapy	Scientist F	MDT with 10 years post MDT PhD (DT) with 06 years post PhD (DT)
Additional Director	Senior Professor	General Manager Dialysis Therapy	Scientist G	MDT with 12 years post MDT PhD (DT) with 08 years post PhD (DT)
Director	Dean / Principal	National Head/ Product Manager	Scientist H/ Research Head/ Director/ ADG	MDT with 14 years post MDT PhD (DT) with 10 years post PhD (DT)

Career progression

Career progression

*** Similar to Nurse practitioners, the task force proposes the creation of the Renal Healthcare Practitioner and Renal Healthcare Specialist categories. The delineation of responsibilities/Scope of practice/ Competencies for these positions shall be decided by the Medical Technology and Physician Associate Professional Council/National Commission for Allied & Health Professions.**

Definition of Definition of Dialysis Care Associate & Dialysis Therapist

"Dialysis Care Associate" means a person having

Diploma in Dialysis technology obtained after the completion of a full-time program of 2.5 years as recognized by National Commission for Allied and Healthcare Professions, which includes supervised clinical training from any university recognized by the university grants commission established under the university grants commission act 1956;

Dialysis Care Associate Definition: "Dialysis Care Associate are Allied and healthcare Professionals who provides dialysis treatment for patients with acute or chronic kidney disease and also perform, monitor, maintain and manage the Hemodialysis Procedures under the supervision of Dialysis therapist/ Dialysis therapy Technologist".

"Dialysis Therapy Technologist" means a person having

Graduate degree in Dialysis Therapy Technology obtained after the completion of a full-time program of 4 years(baccalaureate) as recognized by National Commission for Allied and Healthcare Professions, which includes supervised clinical training from any university recognized by the university grants commission established under the university grants commission act 1956; or

Dialysis Therapy Technologist Definition: "Dialysis therapy technologist are professionals who provides dialysis treatment for patients with acute or chronic kidney disease and also perform, monitor, maintain and manage the various extra corporeal therapies for patients with renal and non- renal indications".

"Dialysis Therapist" means a person having

Postgraduate degree in Dialysis Therapy, obtained after completing a two-year full-time program following graduation from a 4-year Dialysis Therapy Technology program, or alternatively, holds a Ph.D. in Dialysis Therapy after completing both 4-year graduate and 2-year postgraduate programs in dialysis therapy technology and dialysis therapy respectively.

Dialysis Therapist Definition: "Dialysis Therapist are healthcare Professionals who provides dialysis treatment for patients with acute or chronic kidney disease and also perform, monitor, maintain, manage, studies, advises, researches and supervises the various extra corporeal therapies for patients with renal and non- renal indications".

Education

When developing any educational program, it is necessary that it should be planned such that it is outcome-based, and it meets not just the local and national manpower requirements, but also provides personal satisfaction and career potential for professionals with supporting pathways for their development. One of the major changes is the paradigm shift of the focus from traditional theoretical knowledge to one on skills- and competency/outcome-based education and training. Optimal education/training requires that the student is able to integrate knowledge, skills and behavior in order to be able to perform a professional act adequately in a given situation.

Thus, the following curriculum has been designed accordingly in a prescriptive fashion, with an aim to standardize the content across the nation.

Entry requirements

- Universities can consider NEET appeared candidates along with 50% in 10+2 science (Biology and/or Mathematics as per the requirement of the professions) or University/State entrance examination for admissions in the allied and healthcare programs.
- Students from other boards without English as a compulsory subject may be encouraged to pick English as an elective from available resources on Swayam and similar platforms. The completion of the course will not lead to any university course credit (non-university course).

Program duration

It is recommended that any program developed from this curriculum should have a minimum of the following duration to qualify as an entry level course in Dialysis Technology/ Dialysis Therapy -

- **2.5-year program (including 6 months of clinically supervised training/internship)- Diploma level**
- **4-year program (including 1 year of clinical training /internship)- Bachelor's degree level**
- **2-year program- Master's degree level**

Initially, the academic content should emphasize on establishing a strong scientific basis and in the latter year, it should focus on the application of theory to clinical/reflective practice. The aim of the degree program is to enable the development of the Dialysis Therapy Technologist / Dialysis Therapist as a key member of the multidisciplinary team and to enable him/her to prepare in advance, plan and execute the dialysis treatment, and assure quality.

With the change in the disease dynamics and multifold increase in the cases needing dialysis treatment, it is imperative that a well-structured program of postgraduate education is also encouraged so as to enhance research capacity within the country to widen the scope of clinical practice for the profession. Thus, **a master's degree program is recommended with a minimum of two years of education in specialized field of dialysis therapy.** The post graduate students can contribute significantly in research and academics.

Job availability

Graduates of dialysis technology programs can anticipate a range of employment opportunities upon completion of their studies. Hospitals and Dialysis Facility/units are key areas where Dialysis therapy Technologists are in demand, as they play a crucial role in providing life-saving treatment to patients with kidney disease.

Postgraduates specializing in Dialysis therapy are experiencing heightened demand, particularly within teaching institutions and universities where their expertise is indispensable for training the next generation of dialysis professionals. These institutions rely on the advanced knowledge and specialized skills of postgraduates to impart comprehensive training to aspiring professionals entering the field. By serving as educators and mentors, postgraduates play a pivotal role in shaping the future of dialysis care, ensuring that emerging professionals are equipped with the necessary competencies to deliver quality patient care.

In addition to their role in education, postgraduates in Dialysis therapy often have the opportunity to pursue careers in research. With advanced degrees such as a Ph.D., doctorates can contribute to the continuous advancement of knowledge and innovation in the field of dialysis therapy. Through their research endeavors, they explore novel treatment modalities, investigate underlying mechanisms of kidney disease, and develop groundbreaking technologies that hold the potential to revolutionize patient care. This avenue of research not only enhances the professional development of postgraduates but also fosters progress and improvement in dialysis therapy, ultimately benefiting patients worldwide.

Furthermore, the global demand for skilled and qualified dialysis therapists extends beyond domestic borders. Graduates are often eligible for employment opportunities overseas, where their qualifications, training, and experience are highly regarded. This international appeal opens doors to diverse cultural and professional experiences, providing graduates with the opportunity to make a meaningful impact on a global scale while further honing their skills and expertise.

In addition to the immediate employment prospects, graduates can look forward to entering a field with continuously growing demand for professionals. The increasing prevalence of chronic kidney disease and end-stage renal disease ensures a sustained need for qualified dialysis technologists in the years to come. This trend underscores the importance of the role played by graduates in meeting the healthcare needs of individuals suffering from kidney related ailments, reaffirming the value and significance of their contributions to the field.

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Chapter 4

Institutional Requirements & Recommendations

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Chapter 4: Institutional Requirements & Recommendations

Teaching faculty and infrastructure

The importance of providing an adequate learning environment for the students cannot be over emphasized. Both the physical infrastructure and the teaching staff must be adequate.
Teaching areas should facilitate different teaching methods. While students may share didactic lectures with other disciplines in large lecture theatres, smaller teaching areas should also be provided for tutorial and problem/case-based learning approaches. In all venues that accommodate students, health and safety standards must be adhered to. It is recommended that a faculty and student ratio of 1:10 be followed.

Institutional requirements including details of laboratory, essential equipment's, library, resource books, Journals.

Programs offered	Infrastructure	Teaching Faculty Requirement	Equipment's
Diploma	Lecture Halls: 02 Skill Lab: 01 Demonstration Lab/Rooms: 01 Group Discussion Room: 02 Seminar Hall: 01 Library: 01 Faculty Room: 02 Common Room: 01 Department office: 01	Lecturer- 02 Tutor-01 Clinical Instructor- 02	Equipment's to monitor Vital Signs, Vascular Access Dummy for cannulation, Catheter Dummy, Hemodialysis Machine, Dialyzer, Blood Tubing's, Catheters & Other Equipment's
Bachelor's Degree	Lecture Halls: 03 Skill Lab: 02 Demonstration Lab/Room: 01 Seminar Hall: 01 Practical Lab: 02 Group Discussion Rooms: 03 Library: 01 Faculty Rooms- 05 02- Lecturer/ Tutor/ Clinical Instructors Cabin 02- Assistant Professor/ Associate Professor Room 01- HoD Room Common Room-01 Department office- 01 Computer Lab- 01 (05 Computers for Dissertation/ Project)	Head of the Department: 01 (Desirable) Professor: 01 (Desirable) Associate Professor: 01(Desirable) Assistant Professor: 03 Lecturer/ Tutor/ Clinical Instructor: 03 (In event of non-availability of PG Teachers UG may be considered with adequate experience)	Equipment's to monitor Vital Signs, Simulators for PD, Vascular Access Dummy for cannulation, Catheter Dummy, Hemodialysis Machine, CRRT Machines, Extracorporeal Therapies Equipment's, Dialyzer, Blood Tubing's, Catheters & Other Equipment's

Diploma & Bachelor's Degree	Lecture Halls: 04 Skill Lab: 02 Demonstration Lab/Room: 01 Seminar Hall: 01 Practical Lab: 02 Group Discussion Rooms: 04 Library: 01 Faculty Rooms- 05 02- Lecturer/ Clinical Instructors Cabin 02- Assistant Professor/ Associate Professor Room 01- HoD Room Common Room-02 Department office- 01 Computer Lab- 01 (05 Computers for Dissertation/ Project)	Head of the Department: 01 (Desirable) Professor: 01 (Desirable) Associate Professor: 01(Desirable) Assistant Professor: 03 Lecturer/ Tutor/ Clinical Tutor: 03 (In event of non-availability of PG Teachers UG may be considered with adequate experience)	Equipment's to monitor Vital Signs, Simulators for PD, Vascular Access Dummy for cannulation, Catheter Dummy, Hemodialysis Machine, CRRT Machines, Extracorporeal Therapies Equipment's, Dialyzer, Blood Tubing's Catheters & Other Equipment's
Bachelor's Degree & Master's Degree	Lecture Halls: 04 Skill Lab: 02 Demonstration Lab/Room: 01 Seminar Hall: 01 Practical Lab: 02 Group Discussion Rooms: 04 Library: 01 Faculty Rooms- 05 02- Lecturer/ Clinical Instructors Cabin 02- Assistant Professor/ Associate Professor Room 01- HoD Room Common Room-02 Department office- 01 Computer Lab- 01 (05 Computers for Dissertation/ Project)	Head of the Department/ Professor: 01 Associate Professor: 01 Assistant Professor: 03 Lecturer/ Tutor/ Clinical Tutor: 03 (In event of non-availability of PhD Qualified Faculties, PG Teachers with adequate experience may be considered)	Equipment's to monitor Vital Signs, Simulators for PD, Vascular Access Dummy for cannulation, Catheter Dummy, Hemodialysis Machine, CRRT Machines, Extracorporeal Therapies Equipment's, Dialyzer, Blood Tubing's Catheters & Other Equipment's

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Diploma, Bachelor's Degree & Master's Degree	Lecture Halls: 05 Skill Lab: 02 Demonstration Lab/ Room: 01 Seminar Hall: 01 Practical Lab: 02 Group Discussion Rooms: 04 Library: 01 Faculty Rooms- 05 • 02- Lecturer/ Clinical Instructors Cabin • 02- Assistant Professor/ Associate Professor Room • 01- HoD Cabin Common Room-02 Department office- 01 Computer Lab- 01 (05 Computers for Dissertation/ Project)	Head of the Department/ Professor: 01 Associate Professor: 02 Assistant Professor: 03 Lecturer/ Tutor/ Clinical Tutor: 03 (In event of non-availability of PhD Qualified Faculties, PG Teachers with adequate experience may be considered)	Equipment's to monitor Vital Signs, Simulators for PD, Vascular Access Dummy for cannulation, Catheter Dummy, Hemodialysis Machine, CRRT Machines, Extracorporeal Therapies Equipment's, Dialyzer, Blood Tubing's, Catheters & Other Equipment's

Library

List of Books & Journals recommended – Annexure 1 & 2

Guidelines for Standalone Institutes with respect to MoUs with other institutions/ facilities

1. Student faculty ratio to be maintained.
2. Requirements related to infrastructure, labs and demonstration room to be made available.

MoU's with the Multi-Specialty Hospital or Tertiary Care Hospital offering different modalities of Renal Replacement Therapy provided that at least one student for 3 dialysis machines in the unit with a patient load of two shifts of dialysis per day.

Stipend to the students during the internship period

The taskforce strongly recommends providing a stipend to students during their internship period. It is advisable for the University/Institution to determine and set a reasonable amount for this stipend, ensuring that students are adequately supported during their practical training experience.

Seminars/workshops

Students need to participate at least 2 National and International Seminars, Workshops, Conferences, or Webinars annually, enabling them to stay abreast of new technologies and advancements in the field.

Logbooks for evaluation

Logbook has to be maintained for all the semesters and to be submitted for the formative and summative evaluation.

Recommended log book format:

1. Annexure- 3 – Diploma in Dialysis Technology
2. Annexure-4 – Bachelors in Dialysis Therapy Technology (1st Semester to 6th Semester)
3. Annexure-5 - Bachelors in Dialysis Therapy Technology- Internship
4. Annexure- 6 – Masters in Dialysis Therapy

Faculty development program

Each semester, faculty members are required to attend a minimum of 2 Faculty Development Programs (FDPs) to familiarize themselves with the use of new technologies in teaching and research.

Modalities for exit exam/licensure exam

As per the rules and regulations of the National Commission for Allied and Healthcare Professions.

Other Recommendations by experts

1. **For teaching faculty 1:10 student ratio is proposed.**
2. **Student intake was recommended as one student for each 3-dialysis hemodialysis machines in the unit with a patient load of two shifts of dialysis per day.**
3. **An in-house preceptor is to be allocated for each of 5 students for supervision of clinical practical, clarifications, counseling and guidance.**
4. **As far as possible the theory knowledge is to be backed with practical clinical scenarios to develop the needed workforce oriented or job ready knowledge, learning and therapeutic management.**
5. **More emphasis is to be laid more on the practical teaching**
6. **The diploma candidates should be able to join a bachelor's program in the second year as a lateral entry.**
7. **An internship of a period one year after a degree completion is a must. During internship the allocation of night duties under supervision should be mandatory.**
8. **Logbook is mandatory and all procedures witnessed or performed under supervision as student needs to be documented in a logbook.**
9. **A research project is mandatory for the degree candidates and all research projects, thesis and publications to be archived and available online for use by anybody.**
10. **Standardized online theory session repository is to be developed for access to all candidates across the country once registered with an institution.**
11. **Different job cadres for those completed Bachelor of Dialysis Therapy Technology program such as Transplant coordinator, Vascular Access Coordinator and Nephrology Physician Associate etc.**
12. **The Taskforce recommends phasing out the Diploma program in the next five years.**

Clinical Quota for Diploma in Dialysis Technology

1st Year

S.NO	WORK ALLOCATION (Observation & Performance)	Total Procedures
	HEMODIALYSIS	
1	Hemodialysis Priming (Observation)	300
2	Initiation & Cannulation (Observation)	300
3	Return & Termination (Observation)	300
4	Dialyzer Reprocessing (Observation)	300
5	BP Monitoring (Performance)	800
	PROCEDURE	
1	Renal Biopsy- Procedure Coordination (Observation)	10
2	Hemodialysis Central Venous Catheter Insertion - Procedure Coordination (Observation)	20
3	Hemodialysis Central Venous Catheter Dressing (Observation)	30
4	Hemodialysis Central Venous Catheter Removal (Observation)	25

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2nd Year

S.NO	WORK ALLOCATION (Observation & Performance)	Total Procedures
	HEMODIALYSIS	
1	Hemodialysis Priming (Observation)	300
2	Initiation & Cannulation (Observation)	300
3	Return & Termination (Observation)	300
4	Dialyzer Reprocessing (Observation)	300
5	Water Treatment Plant Maintenance (Observation)	50
6	BP Monitoring (Performance)	800
	PROCEDURE	
1	Renal Biopsy- Procedure Coordination (Observation)	10
2	Hemodialysis Central Venous Catheter Insertion – Procedure Coordination (Observation)	25
3	Hemodialysis Central Venous Catheter Dressing (Observation)	40
4	Hemodialysis Central Venous Catheter Removal (Observation)	25
	Special Procedures	
1	PD (Observation)	50

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Internship

S.NO	WORK ALLOCATION (Observation & Performance)	Total Procedures
	HEMODIALYSIS	
1	Hemodialysis Priming (Performance)	350
2	Initiation & Cannulation (Performance)	350
3	Return & Termination (Performance)	350
4	Dialyzer Reprocessing (Performance)	350
5	Water Treatment Plant Maintenance (Performance)	50
6	BP Monitoring (Performance)	1500

Clinical Quota for Bachelors in Dialysis Therapy Technology

1st Year

S.NO	WORK ALLOCATION	Total Procedures
1.	Nephrology OPD (Observation)	50
2.	Nephrology Ward (Observation)	50
3.	Hemodialysis Procedure (Observation)	350
4.	Renal Biopsy (Observation)	10

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2nd Year

S.NO	WORK ALLOCATION	Total Procedures
1.	Nephrology OPD	100
2.	Nephrology Ward	100
	HEMODIALYSIS	
1	Hemodialysis Priming (Observation/ Performance)	400
2	Initiation & Cannulation (Observation/ Performance)	400
3	Return & Termination (Observation/ Performance)	400
4	Dialyzer Reprocessing (Observation/ Performance)	400
5	Hemodialysis Procedure (Monitoring)	1000
	Other Procedures	
1	Renal Biopsy (Observation/ Assisting)	10
2	Hemodialysis Central Venous Catheter Insertion - Procedure Coordination (Observation/ Assisting)	25
3	Hemodialysis Central Venous Catheter (Observation/ Assisting)	40
4	Hemodialysis Central Venous Catheter Removal (Observation/ Assisting)	25
5	Peritoneal Dialysis (Observation/ Assisting)	50

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3rd Year

S.NO	WORK ALLOCATION	Total Procedures
	HEMODIALYSIS	
1	Hemodialysis Priming (Performance)	400
2	Initiation & Cannulation (Performance)	400
3	Return & Termination (Performance)	400
4	Dialyzer Reprocessing (Performance)	400
5	Hemodialysis Procedure (Monitoring)	1000
	Other Procedures	
1	Renal Biopsy (Assisting)	10
2	Hemodialysis Central Venous Catheter Insertion - Procedure Coordination (Assisting)	25
3	Hemodialysis Central Venous Catheter (Assisting)	40
4	Hemodialysis Central Venous Catheter Removal (Assisting)	25
5	Peritoneal Dialysis (Performance)	50
6	CRRT (Observation/ Performance)	10
7	Transplant workup	10
8	AVF, AVG Creation (Observation)	10
9	Renal Transplantation (Observation)	05
10	Plasmapheresis/ Hemoperfusion/ Other EC procedures (Observation)	10
11	Dialysis in ICU (Performance)	20

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Internship

S.NO	WORK ALLOCATION	Total Procedures
1	Nephrology OPD	100
2	Nephrology Ward	100
	HEMODIALYSIS	
1	Hemodialysis Priming (Performance)	750
2	Initiation & Cannulation (Performance)	750
3	Return & Termination (Performance)	750
4	Dialyzer Reprocessing (Performance)	750
5	Hemodialysis Procedure (Monitoring)	1500
	Other Procedures	
1	Renal Biopsy (Assisting)	10
2	Hemodialysis Central Venous Catheter Insertion - Procedure Coordination (Assisting)	25
3	Hemodialysis Central Venous Catheter (Assisting)	50
4	Hemodialysis Central Venous Catheter Removal (Assisting)	25
5	Peritoneal Dialysis (Performance)	30
6	CRRT (Observation/ Performance)	10
7	Transplant workup	10
8	AVF, AVG Creation (Observation)	10
9	Renal Transplantation (Observation)	05
10	Plasmapheresis/ Hemoperfusion/ Other EC procedures (Performance)	10
11	Dialysis in ICU (Performance)	20

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Clinical Quota for Masters in Dialysis Therapy

1st Year

S.NO	WORK ALLOCATION	Total Procedures
1	Nephrology OPD	200
2	Nephrology Ward	200
	HEMODIALYSIS	
1	Hemodialysis Priming (Performance)	200
2	Initiation & Cannulation (Performance)	200
3	Return & Termination (Performance)	200
4	Dialyzer Reprocessing (Performance)	100
	Other Procedures	
1	Renal Biopsy Coordination	20
2	Hemodialysis Central Venous Catheter Insertion - Procedure Coordination	25
4	Hemodialysis Central Venous Catheter Removal	25
5	Peritoneal Dialysis (Performance)	30
6	CRRT (Performance)	10
7	Transplant workup	10
8	Plasmapheresis/ Hemoperfusion/ Other EC procedures (Performance)	10
9	Dialysis in ICU (Performance)	20
10	Peritoneal Dialysis Catheter Insertion (Coordination)	20

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2nd Year

S.NO	WORK ALLOCATION	Total Procedures
1	Nephrology OPD	200
1	Nephrology Ward	200
	HEMODIALYSIS	
1	Hemodialysis Priming (Performance)	200
2	Initiation & Cannulation (Performance)	200
3	Return & Termination (Performance)	200
4	Dialyzer Reprocessing (Performance)	200
	Other Procedures	
1	Renal Biopsy Coordination	20
2	Hemodialysis Central Venous Catheter Insertion - Procedure Coordination	25
3	Hemodialysis Central Venous Catheter Removal	25
4	Peritoneal Dialysis (Performance)	30
5	CRRT (Performance)	10
6	Transplant workup	10
7	Plasmapheresis/ Hemoperfusion/ Other EC procedures (Performance)	10
8	Dialysis in ICU (Performance)	20
9	Peritoneal Dialysis Catheter Insertion (Coordination)	20

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Chapter 5

Curriculum of Dialysis Technology, Dialysis Therapy Technology & Dialysis Therapy Program

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Chapter 5: Curriculum of Dialysis Technology, Dialysis Therapy Technology & Dialysis Therapy Program

Background

Educational programs should provide the Dialysis Care Associate/ Dialysis Therapy Technologist/ Dialysis Therapist with a scientific theoretical foundation of the profession and enable them, as practitioners, to be able to synthesize, evaluate and apply their knowledge in a clinical setting.

The aims of the recommended curriculum are to produce the Dialysis Care Associate/ Dialysis Therapy Technologist/ Dialysis Therapist who are:

- Technically and clinically competent;
- Aware of the importance of quality assurance;
- Understand the theoretical basis for evidence-based practice;
- Effective members of the multidisciplinary team;
- Prepared to participate in or initiate research into practice;
- Can work according to registration requirements on the respective continents.

All aspects of dialysis therapy technology have been considered in the development of this curriculum, together with the identification of the roles expected for different levels of dialysis therapy technologist/ dialysis therapist based on their qualification and experience. The need for connecting the dots between the education and employment practices has been the road map for devising this curriculum.

The National Curriculum Taskforce on Dialysis Therapy Technology/ Dialysis Therapy has successfully designed the career and qualification map indicating growth opportunities for a professional in the career pathway.

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5.1 Diploma in Dialysis Technology (DDT)

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Diploma in Dialysis Technology (DDT)

Introduction:

Learning objectives:

1. Demonstrate Knowledge about Renal failure & its management and apply the principles of dialysis; develop skills necessary to provide safe and effective care to the individual undergoing hemodialysis treatments.
2. Function as a dialysis care associate under the supervision of the senior dialysis therapy technologist/dialysis therapist/nephrologist or physician in a dialysis facility that provides dialysis treatment to the individuals diagnosed with acute or chronic kidney disease.
3. Demonstrate the use of hemodialysis equipment with an understanding of how to operate Dialysis equipment and the knowledge of alternate dialysis procedures.
4. Assess the patient for any complications with an understanding of the problem and recognize the need to report the complications to the physician or nephrologist.
5. Demonstrate polite and strategic communication skills, grooming skills, professional etiquette.
6. Able to understand operation, routine maintenance, identification of malfunction, troubleshooting and minor repair for all equipment used in dialysis units such as hemodialysis machines, water treatment plants, dialyzer reprocessing machines, etc.

Scope of the Curriculum & Expectation from the future graduate in the providing patient care:

1. The primary goal of the Diploma in Dialysis Technology program is to prepare Dialysis Care Associate's with a specific emphasis on clinical skills and technical knowledge.
2. Trainees acquire the knowledge and procedural skills necessary to deliver a high standard of care to the patients with chronic kidney disease requiring renal replacement therapy.
3. This program involves all aspects of care for patients undergoing chronic Hemodialysis and Peritoneal dialysis.
4. The overall goal of this training is to foster the trainee's development into an Allied & Healthcare Personnel in the field of dialysis.
5. The program intends for its graduates to contribute to a new generation of academic dialysis Professionals equipped to address the challenging problems in dialysis therapy.

Eligibility for admission:

Selection procedure

1. Candidate should have passed 10+2 with science.
2. Minimum percentage of marks: 50% aggregate in PCB
3. Reservation for SC/ST/OBC categories: As per Govt. of India rules

Provision of Lateral Entry:

Since this is the basic entry level for dialysis professionals, lateral entry is not applicable.

Duration of the program

Duration of the program is 2.5 years or 5 semesters (inclusive of six months of internship) with 705 hours of Lecture & 1425 hours of Practical Training and another 720 hours dedicated for internship.

Total number of hours – 2850

Total Credits: 100

Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

Attendance:

A candidate will be permitted to appear for the University Examination for any semester if he/she secures not less than 80% of attendance in the number of instructional days at industry during the calendar year, failing which he/she should complete the number of days/hours and undergo the next semester/final examination conducted by the university.

A candidate has to secure a minimum of 80% in skills training (practical) for qualifying to appear for the final examination. No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition, etc.

Assessment:

Formative Assessment

Structured logbook
Structured case presentation
Case presentation
Internal Assessment Examinations (Theory & Practical's)

Summative Assessment

End Semester Examination
Viva-voce examination.
Objective Structured Clinical Examination (OSCE)
Objective Structured Practical Examination (OSPE)

Marks qualifying for a pass.

For End Semester Examination subjects: 50% in internal assessment, 50% in theory examination, 50% in practical examination and 50% in aggregate

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Curriculum Scheme

Semester I														
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
DDT-001	Introduction to Healthcare Delivery System in India		4			4	45	30	75	80	100			100
DDT-002	Basic computer and information Science, Communication and soft skills		1		1	2	15	30	45	80	100			100
DDT-003	Human Anatomy & Physiology	A	4	1		5	60	30	90	80	50	100		100
DDT-004	Basics of Microbiology, Biochemistry, pathology		4	1		5	60	30	90	80	50	50		100
DDT-005	Human Anatomy & Physiology Practical's	A			1	1		30	30	80	50		50	100
DDT-006	Community orientation & Clinical Visit			3		3		135	135	80	100			100
	Total		12	6	2	20	180	285	465		450	150	50	600

Semester II														
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
DDT-007	Medical Terminology and Record keeping, Medical Law and Ethics		5			5	75		75	80	100			100
DDT-008	Basics of Pharmacology		3	1		4	45	30	75	80	50	100		100
DDT-009	Professionalism and values		1	1		2	15	30	45	80	100			100
DDT-010	Introduction to Kidney diseases		3	1		4	45	30	75	80	50	100		100
DDT-011	Clinical Postings I			6		6		270	270	80	50		50	100
	Total		12	9	0	21	180	360	540		350	200	50	500

Semester III															
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
DDT-012	Principles and practice of Dialysis (Part I)	B	4	1		5	60	30	90	80	50	100		100
DDT-013	Instruments Specific to Dialysis Therapy		4	1		5	60	30	90	80	50	100		100
DDT-014	Principals of Management		3	0		3	45		45	80	100			100
DDT-015	Pharmacology related to dialysis		2	1		3	30	30	60	80	50	100		100
DDT-016	Principles and practice of Dialysis Practicals	B			1	1		30	30	80	50		50	100
DDT-017	Clinical Postings II			6		6		270	270	80	100			100
Total			13	9	1	23	195	390	585		400	300	50	600

Semester IV														
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
DDT-018	Principles and practice of Dialysis (Part II)	C	4	1		5	60	30	90	80	50	100		100
DDT-019	BLS	D	2			2	30		30	80	50	100		100
DDT-020	Renal Nutrition		2			2	30		30	80	50	100		100
DDT-021	Basic Principles of Nursing Care		2			2	30		30	80	100			100
DDT-022	Principles and practice of Dialysis (Part II) Practicals	C			2	2		60	60	80	50		50	100
DDT-023	BLS Practicals	D			1	1		30	30	80	50		50	100
DDT-024	Clinical Postings III				6	6		270	270	80	50		50	100
Total			10	1	9	20	150	390	540		400	300	150	700

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Semester V														
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
DDT-025	Compulsory Rotatory Internship			16		16		720	720	100	100			100
Total				16		16		720	720		100			100
Grand Total			47	41	12	100	705	21450	720		1700	950	300	2500

Results in Group (RG) – For Programs wherein Theory and Practical's (Lab Course) are assessed jointly (RG), the passing minimum for the theory exams and Practical exams have to be obtained separately, in order to be declared passed in the individual courses and thereby earning the credits for both Theory and Practical courses. Reappearance in any one of the components (Theory or Practical) is treated as reappear in both these components (Theory and Practicals).

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First Semester

Introduction to National Healthcare System (75 Hours)

The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

1. Introduction to healthcare delivery system
    a. Healthcare delivery system in India at primary, secondary and tertiary care
    b. Community participation in healthcare delivery system
    c. Health system in developed countries.
    d. Private Sector
    e. National Health Mission
    f. National Health Policy
    g. Issues in Health Care Delivery System in India
2. National Health Program- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Program.
3. Introduction to AYUSH system of medicine
    a. Introduction to Ayurveda.
    b. Yoga and Naturopathy
    c. Unani
    d. Siddha
    e. Homeopathy
    f. Need for integration of various system of medicine
4. Health scenario of India- past, present and future
5. Demography & Vital Statistics-
    a. Demography – its concept
    b. Vital events of life & its impact on demography
    c. Significance and recording of vital statistics
    d. Census & its impact on health policy
6. Epidemiology
    a. Principles of Epidemiology
    b. Natural History of disease
    c. Methods of Epidemiological studies
    d. Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

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Basic computers and information science, Communication and Soft Skill (45 Hours)
Part A – Basic computers and information science

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation. Topics to be covered under the subject are as follows:

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
8. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system.
10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
11. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
12. Application of Computers in clinical settings.

Practical on fundamentals of computers -

1. Learning to use MS office: MS word, MS PowerPoint, MS Excel.
2. To install different software.
3. Data entry efficiency

Part B – Communication, soft skill & English

Topics to be covered under Communication & soft skills course–

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.
4. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication
7. Barriers of communication & how to overcome.

Topics to be covered under English course–

1. Spoken Communication
   a. Learning to read the phonetic symbols
   b. Stress
   c. Intonation
   d. Rhythm
   e. Commonly mispronounced words
   f. Correct pronunciation of important commonly used words in hospital practice
2. Vocabulary and Reading
   a. Special features of English vocabulary
   b. Common errors in choice of word
   c. Semi technical vocabulary
   d. Collecting material from library on scientific topics
   e. Comprehensive exercises
3. Writing
   a. Writing letters regarding permission, leave, opening bank account etc.
   b. Taking notes from lecture / reading materials
   c. Writing reports on patient care
   d. Summarizing scientific passages
4. Grammatical and Idiomatic Usage
   a. Correction of errors
   b. Types of interrogative sentences
   c. Active-Passive voice
   d. Tense
   e. Principles of procession, clarity and specificity

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Human Anatomy & Physiology (90 Hours)

1. Introduction to anatomy
   Scope of Anatomy and Physiology, Definitions and Terms, Structure and functions of the human cell, Elementary tissues of the 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.
2. Cardiovascular System
   Structure and functions of various parts of the heart, arterial and venous system, brief account on common cardiovascular disorders
3. Respiratory System
   Various parts of respiratory system and their functions, Physiology of Respiration
4. Digestive System
   Names and various parts of the digestive system – Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption
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
6. Reproductive System
   Physiology and anatomy of Male & Female reproductive system-Prostate, Uterus, Ovaries, etc.
7. Musculoskeletal System
   Classification of bones & joints, structure of skeleton –structure of skeletal muscle – physiology of muscle contraction
8. Nervous System
   Various parts of nervous system, brain and its parts, functions of the nervous system; and Spinal Cord & Nerves
9. Ear, Nose, Throat and Eye
   Elementary knowledge of structure and functions of organs of taste, smell, hearing, vision
10. Endocrine System
    Endocrine glands, their hormones, and functions – Thyroid, Parathyroid, Suprarenal, Pituitary, pituitary and Thymus
11. Haemopoietic and Lymphatic System
    Name of the blood vessels & lymph gland locations, arterial and venous system of the upper and lower limbs with special reference to vascular access
12. Surface Anatomy & Surface Markings of Human Body

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Basic of Microbiology, Biochemistry & Pathology (90 Hours)
Part A – Microbiology

1. Morphology
    a. Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.
2. Growth and nutrition
    a. Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.
3. Culture media
    a. Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.
4. Sterilization and Disinfection
    a. Principles and use of equipment of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, antiseptic and disinfectants.
5. Immunology
    a. Immunity, vaccines, types of vaccine and immunization schedule, principles and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA.
    b. Rapid tests for HIV and HBsAg (excluding technical details).
6. Systematic Bacteriology
    a. Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (excluding classification, antigenic structure and pathogenicity),
    b. Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, *E. coli*, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes.
7. Virology
    a. General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.
8. Hospital infection
    a. Causative agents, transmission methods, investigation, prevention and control of hospital infection.
9. Principles and practice Biomedical waste management

Part B- Biochemistry:

1. Carbohydrates
    Glucose and Glycogen Metabolism

2. Proteins:
    Classification of proteins and functions

3. Lipids:
    Classification of lipids and functions

4. Enzymes
    Definition, Nomenclature, Classification, Factors affecting enzyme activity, Active site. Coenzyme, Enzyme Inhibition, Units of enzymes, Isoenzymes and Enzyme pattern in diseases

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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 and Kwashiorkor

6. Acids and bases:

   Definition, pH, Henderson – Hassel Balch equation, Buffers, Indicators, Normality, Molarity, Molality

Part C- Pathology

1. Clinical Pathology
   a. Introduction to clinical pathology.
   b. Collection, transport, preservation, and processing of various clinical specimens.
   c. Urine Examination: collection and preservation of urine, physical, chemical, microscopic examination.
   d. Examination of body fluids.
   e. Examination of cerebro spinal fluid (CSF).
   f. Sputum examination.
   g. Examination of faeces.

2. Hematology
   a. Introduction to hematology.
   b. Normal constituents of blood, their structure and function.
   c. Collection of blood samples.
   d. Anticoagulants used in hematology.
   e. Instruments and glassware used in hematology, preparation and use of glassware.
   f. Laboratory safety guidelines.
   g. SI units and conventional units in hospital laboratory.
   h. Hb, PCV.
   i. ESR.
   j. Normal hemostasis.
   k. Bleeding time, clotting time, prothrombin time, activated partial thromboplastin time.

3. Blood Bank
   a. Introduction.
   b. Blood grouping and Rh types.
   c. Cross matching.

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Human Anatomy & Physiology Practical's (45 Hours)

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

Community orientation & Clinical visits (135 Hours)

The objective of this particular section of the foundation course is to sensitize potential learners with essential knowledge; this will lay a sound foundation for their learning across the under-graduate program and across their career. Innovative teaching methods should be used to ensure the attention of a student and make them more receptive such as group activities, interactive fora, role plays, and clinical bed-side demonstrations.[ii]

1. The community orientation will include the entire chain of healthcare delivery system - Sub center, PHC, CHC, SDH, DH and medical college, private hospitals, dispensaries and clinics.
2. The student will also be briefed regarding governance at village level including interaction and group discussion with village panchayat and front-line health workers.

Second Semester

Medical terminologies and record keeping, Medical Law and Ethics (75 Hours)

Part A- Medical terminologies and record keeping

This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests.[iii]Topics to be covered under the subject are as follows:

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic medical terms.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical orders/reports.
9. Data entry and management on electronic health record system.

Part B- Medical law and ethics

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.[iv]

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice".

Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. 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.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent.

Basics of Pharmacology (75 Hours)

1. General Pharmacology
    a. Introduction
    b. Routes of drug administration
    c. Pharmacokinetics
    d. Pharmacodynamics
    e. Drug toxicity and safety
2. Autonomic nervous system including skeletal muscle relaxants.
    a. Cholinergic drugs
    b. Anticholinergic drugs:
    c. Neuromuscular blocking drugs
    d. Adrenergic drugs
    e. Adrenergic receptor antagonists

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3. Central nervous system
    a. General anesthetics (GAs)
    b. Local anesthetics (LAs)
    c. Sedative & hypnotics
    d. Opioids
    e. NSAIDs
    f. Drug treatment of rheumatoid arthritis (RA)
    g. Drug treatment of gout:
    h. Psychopharmacology
    i. Parkinsonism
    j. Alcohol
    k. Antiepileptic drugs
4. GIT
    a. Drugs for peptic ulcer
    b. Antiemetics
    c. Laxatives and antidiarrheals
5. Blood
    a. Hematinic
    b. Anticoagulants
    c. Antiplatelet drugs
    d. Fibrinolytics and antifibrinolytics
6. Cardiovascular system
    a. Diuretics
    b. Antihypertensives
    c. Antianginal drugs
    d. Hypolipidemic
7. Respiratory System
    a. Pharmacotherapy of bronchial asthma
    b. Pharmacotherapy of cough
    c. Antihistaminic

Professionalism and Values (45 Hours)

The course on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant professionalism in terms of healthcare system is and how it affects the overall patient environment.

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
2. Personal values- ethical or moral values
3. Attitude and behavior- professional behavior, 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

Introduction to Kidney Disease (75 Hours)

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.

2. Classification of renal diseases

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

3. Glomerular diseases – causes, types & pathology

   Definition, etiology, pathophysiology of each type, medical and surgical management

4. Tubulointerstitial diseases & renal vascular disorders

   Definition, etiology, pathophysiology of each type, medical and surgical management

5. Acute Kidney Injury

   Definition, etiology, pathophysiology of each type, medical and surgical management

6. Chronic Kidney Diseases

   Definition, etiology, pathophysiology, diagnosis & management

Clinical Postings – Part I (270 Hours)

Students will observe the basic operations of the dialysis unit while interacting with the multidisciplinary team members involved in providing optimal care to dialysis patients. The student will be introduced to various terminology, equipment, and techniques used for treatment.

1. Care of Patient with CKD
2. Care of Patient with ARF
3. Health teaching on prevention of UTI

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Third Semester

Principles and practice of Dialysis Part I (90 Hours)

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 and chronic kidney disease, introduction to Continuous Renal Replacement Therapy (CRRT)

2. Principles of dialysis, quantification of adequacy

   Principles of diffusion, filtration, ultra-filtration, convection, osmosis and diafiltration; solute transport and fluid movement during dialysis; principles of fluid dynamics; hemodialysis and peritoneal dialysis; measuring dialysis adequately: Urea reduction ratio - Urea Kinetic Modeling; pre-dialysis and post-dialysis – BUN measurement, measurement of KT/V.

3. Dialysis Team – rights, responsibilities, patient-doctor relationship

   Overview of the dialysis team; responsibilities of a technologist, nurse and doctor in the dialysis setting; building effective working relationships; its importance; dealing with difficult working relationships; respecting the rights of the patient(s); conflict management

4. Dialysis reuse

   History of dialyzer reprocessing, reason for dialysis reprocessing, steps involved in dialyzer reprocessing, hazards of dialyzer reprocessing, documentation for dialyzer reprocessing

5. Dialyzer Membranes

   Introduction to dialyzer membranes; composition of the dialyzer membranes; types, uses and sizes of the various membranes; principles on which the dialyzer membranes work; newer dialysis membranes and advantages; dialysis membrane: structure, characteristics [molecular weight cut off, ultrafiltration coefficient (Kuf), mass transfer coefficient (KoA) and efficiency, low and high flux, clearance (K)]; Biocompatibility; High performance membranes

6. Vascular Access – Temporary & Permanent

   Types of vascular access – Fistulae, Grafts, Catheters; pre-dialysis assessments for all types of vascular access; methods of needle insertion for AVFs and grafts; pre-dialysis assessment, accessing procedure, exit site care, and monitoring of catheters; understanding the role of a vascular access coordinator.

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7. Equipment, Accessories, Function

Types of equipment used in the dialysis process; parts of a dialysis machine, tubings and water supply for dialysis; overview of the various equipment, accessories and working of a dialysis machine – 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; hemodialysis apparatus: types of dialyzer & membrane, dialysate

a. Dialysis machines:
b. Latest Hemodialysis machines
c. Conventional and Portable Machines
d. Mechanism of functioning & management:

8. Computer applications in Dialysis

Hospital information system and Electronic Medical Records (EMR) in the dialysis unit, scheduling of procedures, application of computers in the monitoring and maintenance of a dialysis unit

9. Dialysate delivery system

Definition of a delivery system, types of delivery systems.

10. Composition of dialysate

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

11. High flux / high efficiency dialysis

Definition of high flux / high efficiency dialysis, differences between high flux dialysis and hemodialysis, uses and indications for high flux dialysis, complications of high flux dialysis, precautions and contraindications, care during a high flux dialysis

12. 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

13. Water treatment-pretreatment, 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 testing, 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, AAMI standards, ISO requirements, checklists and tools used for optimal compliance

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14. Dialysis in Neonates, infants & children

    Dialysis for infants and neonates, vascular access in this special group, dialysis settings, monitoring and managing complications.

15. Renal data maintenance

    Records and reports maintained in the dialysis unit, need for maintenance of records and report, responsibility of the technologist in maintenance of records and report; medico-legal aspects in the maintenance of records.

16. 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

17. Introduction to Kidney Transplantation:

    Introduction to the basics of kidney transplantation, comprehending recipient evaluation, understanding pre-transplant care of patients on dialysis, understanding the role of a coordinator in kidney transplantation.

18. Prevention of Renal Disease

    Staging and causes of chronic kidney disease, early diagnosis of CKD, counseling on adequate control of diabetes and hypertension, methods to control the progression of CKD, avoiding nephrotoxic drugs, community counseling and awareness about kidney disease, importance of annual master health checkups after 40 years of age, diet and medication counseling for CKD patients, early diagnosis and management of complications of CKD (anemia, malnutrition, mineral bone disease), preparing a patient before ESRD (e.g. early creation of AV fistula etc.)

Instruments specific to dialysis therapy (90 Hours)

1. Content to as Equipment's used in Hemodialysis.
2. HD machine -Components and function
3. HD machine – Blood Circuit
4. HD machine – Dialysate circuit
5. Cleaning and disinfection of HD machine
6. QCM
7. Trouble shooting equipment related problems during HD.
8. Water treatment System
9. Purpose of water treatment
10. AAMI and ISO standards for RO water
11. Filtration
12. Softener and carbon filtration
13. Deionizer
14. RO system
15. Ultrafiltration and UV Irradiation
16. Heat disinfection of water lines
17. Dialyzer Reprocessing Equipment
18. Types of Automated dialyzer reprocessing machine
19. Automated reuse equipment – components and function

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20. Automated reuse equipment – care and maintenance
21. Equipment's used for special procedures.
22. Defibrillators
23. Cardiac Monitors
24. Blood Temperature, Blood Volume monitor

Principals of Management (45 Hours)

The course is intended to provide a knowledge about the basic principles 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

Pharmacology related to dialysis (60 Hours)

1. IV fluid therapy with special emphasis in renal diseases
   Define IV fluids; differentiate between various IV fluids; use of crystalloids and colloids in renal diseases; mode of action, contraindication, precautions and side effects of using various IV fluids.

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

3. Anti-hypertensives
   Definition, classification, actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, drugs used in hypotension.

4. Dialyzable drugs
   List of drugs that are dialyzable; action, dosage, side effects and contraindications of phenobarbitone, lithium, methanol, etc.
   Dose & duration of drugs used in dialysis; administration of drugs and the effect of dialysis on the action of drugs

5. Iron
   Use of Iron therapy in dialysis; its metabolism, role in RBC formation and anemia; forms of iron therapy; indications for use; available forms and dosages

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6. Erythropoiesis Stimulating Agent
   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

7. Heparin including low molecular weight heparin and heparin alternatives.
   Introduction to heparin and low molecular weight heparin, description of heparin & LMWH, pharmacokinetics, mode of action, indications and use, dosage and route of administration & side effects

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

9. Formalin, citrate, sodium hypochlorite, hydrogen peroxide
   Action, characteristics, the use of the drugs, its role as disinfectants, and adverse effects of residual particles applicable to formalin

10. Hemodialysis concentrates
    Composition & dilution (acetate & bicarbonates)

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.

Principals and practice of Dialysis Practical's (30 Hours)

1. Priming of Dialysis Apparatus
2. Dialyzer reuse
3. Monitoring during dialysis
4. Managing complications during dialysis.
5. Understanding Dialysis Blood Circuit.

Clinical Postings – Part II (270 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a dialysis therapy technologist/ Dialysis Therapist/ Nephrologist. Students are tested on intermediate Clinical Dialysis Therapy skills.

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Fourth Semester

Principles and practice of Dialysis Part II (90 Hours)

1. Preparation and positioning of patient for dialysis

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

Introduction to patient assessment, understanding a treatment plan, Equipment preparation – Dialysate - Dialyzer 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, and 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 cannula-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, Discussion of practical clinical case scenarios involving above topics wherever possible.

3. Lab data analysis

Tests done for a patient on Hemodialysis, interpretation of tests and normal values. Discussion of practical clinical case scenarios involving above topics wherever possible.

4. Acute and chronic dialysis prescription under supervision

Common drugs for patients with ARF & CRF, Actions, side effects and special considerations. Discussion of practical clinical case scenarios involving above topics wherever possible.

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. Iron preparations for oral and parental use for renal anemia- dosage, administration and side effects. Antihypertensive use - considerations during dialysis. Cardiac medications- used in patients on dialysis. Vaccines for patients on hemodialysis - need and the schedule. Discussion of practical clinical case scenarios involving above topics wherever possible.

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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 chronic kidney disease. Screening for under nutrition among dialysis patients. Discussion of practical clinical case scenarios involving above topics wherever possible.

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. Role and indications for antidote use. Heparin free dialysis - need and indication. Regional citrate anticoagulation. Discussion of practical clinical case scenarios involving above topics wherever possible.

8. Hemodialysis machine specific technology:

Flow system, blood monitoring and control systems, arterial blood flow monitoring, the blood pump, air detection, venous blood flow/pressure monitoring, single needle system, dialysate monitoring and control systems, conductivity, temperature, deaeration and degassing, ultrafiltration & negative pressure, TMP and volumetric control, blood leak detection, isolated ultrafiltration, sodium, bicarbonate and ultrafiltration profiling, blood volume monitoring, blood temperature monitoring. Repair techniques and procedures, fault diagnostics, computer aided maintenance and planned preventative maintenance.

9. Hemodialysis

The process of Hemodialysis, vascular access. Starting Hemodialysis, priming of the dialyzer, alarms and the settings of a dialyzer, completion of Hemodialysis, closing the Hemodialysis. Cleaning of the tubing's and dialyzer and the dialysis machine. Discussion of practical clinical case scenarios involving above topics wherever possible.

10. Complications of Hemodialysis– Acute & chronic

Complications of Hemodialysis, acute complications – monitoring, prevention for acute complications. Chronic complications – list, prevention strategies, monitoring for chronic complications. Discussion of practical clinical case scenarios involving above topics wherever possible.

11. Peritoneal Dialysis

Acute and Chronic Peritoneal Dialysis. History, access, physiology of Peritoneal Dialysis. PD – Transport kinetics, ultrafiltration, UF, Intermittent PD, Continuous 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. Discussion of practical clinical case scenarios involving above topics wherever possible.

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12. Infectious and noninfectious 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, Discussion of practical clinical case scenarios involving above topics wherever possible.

13. Infection control and universal precautions

Introduction to infection control practices, need for infection control, and 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. Discussion of practical clinical case scenarios involving above topics wherever possible.

14. 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 CKD. Patient education – Diet, prevention of complications, drug compliance. Discussion of practical clinical case scenarios involving above topics wherever possible.

15. 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. Discussion of practical clinical case scenarios involving above topics wherever possible.

16. 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. Discussion of practical clinical case scenarios involving above topics wherever possible.

17. General principle of hospital practice

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

BLS (30 Hours)

1. BLS in perspective
    a. The need for Medical interventions
    b. The ultimate Coronary Care Unit
    c. Emergency Cardiac Care
    d. The chain of Survival
    e. Role of the American Heart Association

2. Cardiopulmonary Function and actions for survival
    a. The Cardiovascular and Respiratory system
    b. Action for survival

3. Risk factors and prudent Heart living
    a. Risk factors for Heart Attack
    b. Prudent Heart Living
    c. Summary: The role of Prevention

4. Adult BLS
    a. Citizen response to Cardio-pulmonary Emergency
    b. Indication for BLS
    c. The sequence of BLS; Assessment, EMS activations and the ABC of CPR
    d. CPR performed by one rescuer and two rescuers
    e. Foreign – Body airway obstruction Management
    f. CPR: The Human Dimension
    g. BLS Research Initiative

5. Special Resuscitation Situation
    a. Stroke
    b. Hypothermia
    c. Near – Drowning
    d. Cardiac arrest associated with Trauma
    e. Electric shock and lightning stroke
    f. Pregnancy
    g. Asphyseration
    h. Special techniques and pitfalls and complication
    i. Unique situation

6. Pediatric BLS
    a. Epidemiology
    b. Injury prevention
    c. Prehospital care
    d. The sequence of Pediatric BLS - the ABC of CPR
    e. Activation of the EMS system obstructive
    f. Foreign Body airway
    g. BLS in Trauma

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7. Ethical and Legal considerations
    a. Values in Decision Making
    b. Instituting and Discontinuing CPR
    c. Legal mandates
    d. Conclusions
    8. Safety during CPR Training and actual rescue
    a. Disease transmission during CPR Training
    b. Disease transmission during actual performance of CPR
    9. Automated External Defibrillation
    a. Importance of Automated External Defibrillation
    b. Overview of Automated External Defibrillation
    c. Advantage and Disadvantage of Automated External Defibrillation
    d. Use of Automated External Defibrillation during Resuscitation attempts
    e. Automated External Defibrillation treatment algorithm
    f. Post resuscitation care
    g. Training
    h. Maintenance of Skills
    i. Medical control
    j. Quality assurance

Renal Nutrition (30 Hours)

Nutritional management of HD patient:

1. Basic Nutrition
2. Nutritional Screening and Assessment
    - Introduction
    - Mini Nutritional Assessment
    - Nutritional Assessment
    - Medical History
    - The effect of comorbidities
    - Medications and Drug-Nutrient Interactions
    - Psychosocial History
    - Dietary History
    - Physical Examination
    - Anthropometric Measurements
    - Biochemical Assessment and Laboratory Data
    - Nutritional Assessment Tools
    - Subjective Global Assessment (SGA)
    - Dialysis Malnutrition Score (DMS)
    - Malnutrition and Inflammation Score (MIS)
    - Dialysis Malnutrition Score (DMS)
    - Malnutrition and Inflammation Score (MIS)
3. Nutrition Management in HD patients
4. Goals of nutritional management in HD patient,
5. factors influencing nutritional status,
6. Purpose of nutrition care in HD patient, diet in HD patient

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Basic Principles of Nursing Care (30 Hours)

1. Bed making
2. Vital Signs Monitoring
3. Input and Output chart
4. Maintenance of emergency crash cart
5. Injections – intravenous, intramuscular, subcutaneous
6. Insertion of intravenous canulae
7. Cleaning and dressing of wounds and vascular access sites and peritoneal catheter exit site
8. Assisting the physician in procedures like minor surgery, vascular access, etc
9. Care of bed ridden patients,
10. Documentation
11. Collection of blood, urine and stool specimens and their transfer aseptic precautions to the laboratory

Principles and practice of Dialysis Part II Practical's (60 Hours)

1. Preparation and positioning of patient for dialysis.
2. Assessment of HD patients
3. Perform HD
4. Perform PD

BLS Practical's (30 Hours)

1. Identify the need of BLS.
2. Perform BLS

Clinical Posting – Part III (270 Hours)

Students will improve their skills in clinical procedures. Progressive interaction with patients and professional personnel are monitored as students practice in Dialysis Therapy unit in a supervised setting. Additional areas include problem solving, identifying machine components and basic side effect management. Students will demonstrate competence in beginning and intermediate procedures.

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Fifth Semester

Internship (720 Hours)

The internship will span 6 months/ 1 semester. This will include 8 hours of practice a day, totaling to 720 hours for one semester.

As a part of this, the students will choose a relevant subject and prepare an in-depth project report of not less than 1000 words which will be handed over to the supervisor or trainer. The report can include objective, scope of the project and an in-depth report.

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in simulation and treatment delivery. Students will demonstrate competence in beginning and intermediate procedures. Students will observe the advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

Competency

Professional Conduct: Dialysis Technology is a highly specialized field of nephrology (care of the kidneys). The Dialysis Care Associate is an allied and health care professional who operates dialysis machines utilized for patients having kidney diseases. Its limitations, code of conduct and complying with the legal, ethical and professional aspects of the practice. Dialysis Care Associate should also be aware of rights of the patients who are seeking the Nephrology service for dignity, privacy, and confidentiality.

This professional conduct should demonstrate to the patients and peers your commitment to the very highest clinical, ethical and professional standards. This will increase public trust and confidence in the profession, therefore, will improve in understanding the role of the Dialysis Care Associate in Dialysis process.

Performance Criteria	Indicators			Measurement Criteria
	Knowledge	Skill	Behavior	
Provides safe and effective care to the individual.	• Identify individual responsibilities in relation to maintaining workplace health safety and security requirements. • Comply with health, safety and security procedures for the workplace	• Demonstrates appropriate use of barrier precautions and cleaning and disinfection procedures. • Demonstrates of vascular access care and technique. • Demonstrates best of the resources to improve the visual requirements • Be aware of the protocol of starting the dialysis • Minimize inconvenience and pain for the patient while performing the procedure	• Greets and respects all patients and their attendants in a caring, sensitive and appropriate manner • Respect towards patients regarding their health care decisions • Ensures equal care and treatment is provided to all patients • Positive attitude and patience towards patient's requirements	• Summative Assessments • Clinical Posting • Formative assessment
Ability to understand the roles and responsibilities of a Dialysis Care Associate.	• Factual knowledge of the principles of dialysis; hemodialysis preparations, methods and techniques; vascular access care and quality control measures.	• Perform all the processes of initiating & terminating dialysis therapy. • Ability to decide on appropriate dialysis prescription.	• Proactive approach to health and safety issues • Responds properly to patient complaints and takes appropriate measures including emergency termination of dialysis if needed	• Formative assessment • Summative Assessments • Clinical Posting

	• Knowledge of possible complications and ways to treat them, ability to recognize dialyzer reaction and involve appropriate supervisory support if needed	• Identify the complication during dialysis and provide instant management.		
Understands the process of Dialysis, Operating dialysis equipment and how to perform alternate dialysis procedures	• Should have depth knowledge about how to handle dialysis machine and water treatment system. • Determines tests and procedures appropriate to the patient's condition and abilities, with nephrologist • Know when the dialysate, dialyzer or other constituents need to be replaced • Understand how to utilize existing catheters for performing dialysis	• Demonstrate and perform hemodialysis, peritoneal dialysis and extracorporeal detoxification. • Handling all types of vascular access for hemodialysis. • Understand the various indicators, alarms and sensors of the dialysis machine • Properly initiates, rinse and disinfection of dialysis machine externally and internally	• Demonstrate good interpersonal relationships with dialysis team. • Seeks consent of the patient before providing information to external stake holders • Restricts self from discussing patient information and condition in any open forum/external communication	• Formative assessment • Summative Assessments • Clinical Posting • Seminars • Viva voce • Demonstration • Spotters

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		• Should know how to assemble and check the extracorporeal circuit parts i.e. the patient connectors, Dialyzer connectors, Drip chamber and bubble trap, Blood pump segment, Heparin infusion line, and saline infusion line • Independently demonstrate & perform AVG/AVF cannulation and Central Venous catheter handling. • Efficiently demonstrates the water treatment plant and AAMI guidelines. • Demonstrates the reuse and reprocessing for the dialyzer. • Demonstrate BLS.		
Administration of medications under the supervision of Nephrologists.	• Properly documents the administration of medication on flow sheet. • Aseptic technique for preparing and administering medications.	• Demonstrates properly administers heparin does and bolus (Method of heparin administration) Types of heparin protocols	• Demonstrate honesty and integrity while medications handling. • Avoids discrimination and malpractice	• Formative assessment • Summative Assessments • Seminars • Viva voce

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	• Should have essential knowledge of administration of other drugs as prescribed by the doctors during and before , after dialysis.	• Demonstrate efficient application of follow International Patients Safety Goals (IPSGE)	• Good communicatio n the patients and the nephrologist.	
Operation and Maintenance of all equipment	• Monitor technical/ clinical vitals during the treatment. • Understand the various indicators, alarms and sensors of the dialysis machine • Be alert and quick in Patient responses • Know whom and how to inform in case of medical emergency	• Performs basic operator troubleshooting, • appropriately initiates, monitors and terminates chemical disinfect procedure for machine, dialyzer and tubing	• a sensitive and caring attitude towards the patient	• Formative assessment • Summative Assessments • Clinical Posting • Seminars • Viva voce • Demonstration • Spotting
Ability to promote ethical and cordial relationship with other health care professionals	• Should have essential knowledge of how to maintain practice in accordance with other professional health care standards	• Explains the condition that are treatable/correct able beyond your practice standards • Refers to respective specialties after careful diagnosis and with referral letter	• Honesty and understanding of own limitations	• Demonstration • Formative assessment • Summative Assessments • Clinical Posting

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Ability to comply with legal, professional and ethical guidelines, law and codes	• Should have in depth knowledge of ethical practice and standard operating procedures followed in the clinical examination • Should have vital knowledge of the law, codes and guidelines set by the regulatory body of profession and is fully aware of the consequences if not followed	• Explains the uses of various diagnostic instruments and their importance in the process of examination • Follows the code of conduct set down by the council/ appropriate authorities	• Demonstrates professional behavior	• Formative assessment • Summative Assessments • Clinical Posting • Demonstration

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5.2 Bachelors of Dialysis Therapy Technology (BDTT)

Bachelors of Dialysis Therapy Technology (BDTT)

Introduction:

Learning Objectives: At the completion of this program, the student should be –

1. Function as a Dialysis Therapy Technologist in a stand-alone dialysis unit as well as in a hospital with a dialysis facility that provides dialysis treatment/extra corporeal therapies to individuals diagnosed with acute or chronic kidney disease and other non-renal indications.
2. Understand and apply the principles of dialysis and the skills necessary to deliver safe and effective care to the individual undergoing dialysis treatments.
3. Demonstrate the use of hemodialysis equipment with an understanding of the process of operating dialysis equipment and alternate dialysis procedures.
4. Assess the patient for any complications with an understanding of the problem and recognize the complications thereby delivering the apt management & treatments under the supervision of the supervisor in a standalone unit or the physician/nephrologist in a hospital.
5. Respond effectively to the physical and emotional needs of the patient undergoing dialysis treatment.
6. Develop the ability to understand the operation, routine maintenance, identification of malfunction in equipment, troubleshooting, and minor repair in equipment used in daily units such as hemodialysis machines, water treatment plants, dialyzer reprocessing machines, etc.
7. Demonstrate renal transplant coordination with the transplantation team.

Scope of Curriculum & Expectation from the future graduate in the providing patient care.

1. The primary goal of the Bachelor of Dialysis Therapy Technology program is to prepare accomplished professionals in renal replacement therapies with a specific emphasis on clinical skills and knowledge of dialysis therapies.
2. The students acquire the knowledge and procedural skills necessary to deliver a high standard of care to patients with chronic kidney disease requiring renal replacement therapy.
3. They will also receive training to conduct research in the field of dialysis.
4. This program involves all aspects of care for patients undergoing chronic hemodialysis and continuous ambulatory peritoneal dialysis (CAPD), renal transplant coordination as well as RRTs in the intensive care unit.
5. The overall goal of this training is to foster the trainee's development into an independent care provider in the field of dialysis.
6. The program intends for its graduates to contribute to a new generation of academic dialysis professionals equipped to address the challenging problems in renal replacement therapy & Other Extracorporeal Therapies.

Eligibility for admission:

Selection procedure:

- Universities can consider NEET appeared candidates along with 50% in 10+2 science (Biology and/or Mathematics as per the requirement of the professions) or University/State entrance examination for admissions in the allied and healthcare programs.

- Students from other boards without English as a compulsory subject may be encouraged to pick English as an elective from available resources on Swayam and similar platforms. The completion of the course will not lead to any university course credit (non-university course).

Provision of Lateral Entry:

There should be a provision for lateral entry for the students who have successfully completed Diploma in Dialysis Technology and would like to pursue Bachelors of Dialysis Therapy Technology /BDTT. In such a case, they can directly enter into the second year or 3rd semester.

Duration of the Program

Duration of the program is 4 years or 8 semesters (inclusive of one year of internship) with 1545 hours of Lecture & 2115 hours of Practical Training and another 2160 hours dedicated for internship and 180 hours dedicated for Dissertation/Project.

Total number of hours – 6000

Total Credits: 216

Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

Attendance:

A candidate has to secure minimum 80% attendance in overall with at least:-

1. 80% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition, etc.

Assessment:

Cognitive Assessment

Structured logbook

Viva-voce examination.

Structured case presentation

Formative assessment

Summative assessment

Case presentation

Psychomotor Assessment

Objective Structured Clinical Examination (OSCE)
Objective Structured Practical Examination (OSPE)
Mini Clinical Evaluation Exercise (Mini-CEX)
Direct Observation of Procedural Skills (DOPS)
Simulation-based assessment

Marks qualifying for a pass.

For End Semester Examination subjects:

50% in internal assessment, 50% in theory examination, 50% in practical examination and 50% in aggregate

Curriculum Scheme

Semester I															
			Credit/ Week				Hours/ Semester					End Semester		Grand Total	
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b÷2) =100	Practical: a + c =100
BDTT -001	Medical Terminology and Record keeping (including Binomical terms)		2			2	30		30	80	100				100
BDTT -002	Professionalism and values & Indian Constitution		2			2	30		30	80	100				100
BDTT -003	Human Anatomy	A	4	1		5	60	30	90	80	50	100			100
BDTT -004	Human Physiology	B	4	1		5	60	30	90	80	50	100			100
BDTT -005	Biochemistry	C	4	1		5	60	30	90	80	50	100			100
BDTT -006	Introduction to Dialysis Therapy		1	1		2	15	30	45	80	50	100			100
BDTT -007	Human Anatomy (Practicals)	A			2	2		60	60	80	50		50		100
BDTT -008	Human Physiology (Practicals)	B			2	2		60	60	80	50		50		100
BDTT -009	Biochemistry (Practicals)	C			2	2		60	60	80	50		50		100
BDTT -010	Community orientation and clinical visit (CT)			2		2		90	90	80	100				100
Total			17	6	6	29	255	390	645		650	400	150		1000

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Semester II															
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b+2) =100 Practical: a + c =100
BDTT -011	Pathology	E	4			4	60		60	80	50	100		100
BDTT -012	Microbiology	F	4			4	60		60	80	50	100		100
BDTT -013	General Pharmacology		4			4	60		60	80	50	100		100
BDTT -014	Applied anatomy & physiology related to Dialysis Therapy	G	4			4	60		60	80	50	100		100
BDTT -015	Fundamentals of Dialysis Therapy	H	3			3	45		45	80	50	100		100
BDTT -016	Pathology (Practicals)	E			1	1		30	30	80	50		50	100
BDTT -017	Microbiology (Practicals)	F			1	1		30	30	80	50		50	100
BDTT -018	Applied anatomy & physiology related to Dialysis Therapy (Practicals)	G			1	1		30	30	80	50		50	100
BDTT -019	Fundamentals of Dialysis Therapy (Practicals)	H			1	1		30	30	80	50		50	100
BDTT -020	Clinical Postings I (CT)			3		3		135	135	80	50		50	100
Total			19	3	4	26	285	255	540		500	500	250	1000

Semester III														
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b+2) =100 Practical: a + c =100
BDTT-021	Sociology in Health Care		3			3	45		45	80	100			100
BDTT-022	Biomedical Waste Management		2			2	30		30	80	100			100
BDTT-023	Pathophysiology of the kidney diseases		3	1		4	45	30	75	80	50	100		100
	Elective Course (To be chosen by the student)													
BDTT-024	Instrumentation Specific to Dialysis Therapy		3	1		4	45	30	75	80	50	100		100
BDTT-025	Basic Principles of Nursing Care		3	0		3	45	0	45	80	100			100
BDTT-026	Medical Law and Ethics		2			2	30		30	80	100			100
BDTT-027	Instrumentation Specific to Dialysis Therapy (Practicals)	I			2	2		60	60	80	50		50	100
BDTT-028	Clinical Postings II (CT)			4		4		180	180	80	50		50	100
Total			16	6	2	24	240	300	540		600	100	100	800

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Semester IV

Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester			Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours			Theory (b)	Practical/ Viva (c)	Theory: a+(b+2) =100 Practical: a + c =100
BDTT-029	Pharmacology related to Dialysis therapy	J	2	1		3	30	30	60	80	50	100		100
BDTT-030	Psychology		3			3	45		45	80	50	100		100
BDTT-031	Renal Nutrition		3			3	45		45	80	50	100		100
BDTT-032	Dialysis Therapies – Part I	K	3	1		4	45	30	75	80	50	100		100
BDTT-033	Medical Electronics for Health Sciences		3			3	45		45	80	50	100		100
BDTT-034	Research Methodology and Biostatistics		4			4	60		60	80	50	100		100
BDTT-035	Pharmacology related to Dialysis therapy (Practicals)	J			2	2		60	60	80	50	100		100
BDTT-036	Dialysis Therapies – Part I (Practicals)	K			2	2		60	60	80	50		50	100
BDTT-037	Clinical Postings III (CT)			4		4		180	180	80	50		50	100
Total			18	6	4	28	270	360	630		450	700	100	900

Semester V

Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester			Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	End Semester Assessment		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours			Theory (b)	Practical/ Viva (c)	Theory: a+(b+2) =100 Practical: a + c =100
BDTT-038	Dialysis Therapies – Part II	L	4			4	60		60	80	50	100		100
BDTT-039	Renal Transplantation and Coordination	M	4			4	60		60	80	50	100		100
BDTT-040	Clinical Problems and Evidenced Based Practice in Dialysis Therapy		4			4	60		60	80	50	100		100
BDTT-041	Advanced Extracorporeal Therapies	N	4			4	60		60	80	50	100		100
	Elective Course (To be chosen by the student)													
BDTT-042	Renal Transplantation and Coordination (Practicals)	M			2	2		60	60	80	50		50	100
BDTT-043	Advanced Extracorporeal Therapies (Practicals)	N			2	2		60	60	80	50		50	100
BDTT-044	Dialysis Therapies – Part II (Practicals)	L			2	2		60	60	80	50		50	100
BDTT-045	Clinical Postings IV (CT)			4		4		180	180	80	50		50	100
Total			16	4	6	26	240	360	600		400	400	200	800

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Semester VI

Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester			Attendance %	Continuous internal assessment CIA- Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours			Theory (b)	Practical/ Viva (c)	Theory: a+[b+2] =100 Practical: a + c =100
BDTT-046	Recent Advancements in Renal replacement therapies	O	4	1		5	60	30	90	80	50	100		100
BDTT-047	Principals of Management		3			3	45		45	80	50	100		100
BDTT-048	Introduction to Quality Assurance in dialysis and Patient safety		3	1		4	45	30	75	80	50	100		100
BDTT-049	Basic and Advanced Cardiac Life Support	P	2			2	30		30	80	50	100		100
	Elective Course (To be chosen by the student)													
BDTT-050	Recent Advancements in Renal replacement therapies (Practicals)	O			2	2		60	60	80	50		50	100
BDTT-051	Basic and Advanced Cardiac Life Support (Practicals)	P			1	1		30	30	80	50		50	100
BDTT-052	Clinical Postings V (CT)			6		6		270	270	80	50		50	100
Total			12	8	3	23	180	420	600		350	400	150	700

Semester VII

Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester			Attendance %	Continuous internal assessment CIA- Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours			Theory (b)	Practical/ Viva (c)	Theory: a+[b+2] =100 Practical: a + c =100
BDTT-053	Compulsory Rotatory Internship			24		24		1080	1080	100	100			100
Total				**24**		**24**		**1080**	**1080**		**100**			**100**

Semester VIII

Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester			Attendance %	Continuous internal assessment CIA- Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours			Theory (b)	Practical/ Viva (c)	Theory: a+[b+2] =100 Practical: a + c =100
BDTT-054	Compulsory Rotatory Internship			24		24		1080	1080	100	50		50	100
BDTT-055	Dissertation/Project				6	6		180	180	90	50		50	100
Total				24	6	30		1260	1260		100		100	200

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Elective Course														
			Credit/ Week				Hours/ Semester					End Semester		Grand Total
Course Code	Course	Result in Group (RG) #	Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours	Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	Theory (b)	Practical/ Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
BDTT-056	Introduction to Healthcare Delivery System in India		2			2	30		30	80	100			100
BDTT-057	Basic computers and information Science		1		1	2	15	30	45	80	100			100
BDTT-058	Communication and soft skills		2			2	30		30	80	100			100
Total			5	0	1	6	75	30	105		300			300
Grand Total			**103**	**81**	**32**	**216**	**1545**	**4455**	**6000**		**3450**	**2500**	**1050**	**5800**

Results in Group (RG) – For Programs wherein Theory and Practical's (Lab Course) are assessed jointly (RG), the passing minimum for the theory exams and Practical exams have to be obtained separately, in order to be declared passed in the individual courses and thereby earning the credits for both Theory and Practical courses. Reappearance in any one of the components (Theory or Practical) is treated as reappear in both these components (Theory and Practical's).

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राष्ट्रीय सहबद्ध और स्वास्थ्य देखभाल वृत्ति आयोग

First Semester

Medical terminologies and record keeping (30 Hours)

This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests. Topics to be covered under the subject are as follows:

1. Derivation of medical terms. - Origin, uses and purpose of medical terminology,
2. Word roots, prefixes, and suffixes. - Musculo-skeletal system, respiratory system, cardiovascular system, Digestive system, Endocrine system, Central Nervous system, Urinary system, Reproductive system, Organs of special sense and Integumentary system. prefixes and pseudo prefixes used in medical terminology, suffixes and pseudo suffixes used in medical terminology.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic anatomical medical terms.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical orders/reports.
9. Formats and Contents of medical records
10. Data entry and management on electronic health record system.

Professionalism and Values & Indian Constitution (30 Hours)

Part A Professionalism and Values

The course on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant professionalism in terms of healthcare system is and how it affects the overall patient environment.

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
2. Personal values- ethical or moral values
3. Attitude and behavior- professional behavior, 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

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Part B Indian Constitution

The course on Indian Constitution provides understanding of knowledge of the Indian constitution. Familiarize students with the fundamental rights and duties. Understand the importance of constitutional laws. Understand the correlation between Indian constitution, democracy, and society.

1. Meaning of the term 'Constitution'. Making of the Indian Constitution 1946- 1950.
2. The democratic institutions created by the constitution, bicameral system of Legislature at the Centre and in the States.
3. Fundamental rights and duties their content and significance.
4. Directive principles of States, policies need to balance fundamental rights with directive principles.
5. Special rights created in the Constitution for Dalits, backwards, women and children and the religious and linguistic minorities.
6. Doctrine of Separation of Powers, legislative, executive, and judicial and their functioning in India.
7. The Election Commission and State Public Service commissions.
8. Method of amending the Constitution.
9. Enforcing rights through writs.
10. Constitution and sustainable development in India.

Human Anatomy (90 Hours)

1. Introduction: Human body as a whole
   a. Definition of anatomy and its divisions.
   b. Terms of location, positions, and planes.
   c. Cell and its organelles.
   d. Epithelium: definition, classification, describe with examples, function.
   e. Glands: classification, describe serous, mucous & mixed glands with examples.
   f. Basic tissues: classification with examples
2. Locomotion and support
   a. Cartilage: types with example & histology.
   b. Bone: classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, inter-vertebral disc, fontanelles of fetal skull.
   c. Joints: classification of joints with examples, synovial joint (in detail for radiology).
   d. Muscular system: classification of muscular tissue & histology, names of muscles of the body.

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3. Cardiovascular system
    a. Heart: size, location, chambers, exterior & interior, blood supply of heart.
    b. Systemic & pulmonary circulation, branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, peripheral pulse, inferior vena cava, portal vein, porto-systemic anastomosis, great saphenous vein, dural venous sinuses. Lymphatic system: cisterna chyli & thoracic duct, histology of lymphatic tissues, names of regional lymphatics, axillary and inguinal lymph nodes in brief. Anatomy correlated to vascular access to be emphasized.

4. Gastro-intestinal system
    a. Parts of GIT, oral cavity, lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring, esophagus, stomach, small and large intestine, liver, gall bladder, pancreas, radiographs of abdomen.
5. Respiratory system
    a. Parts of RS, nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, histology of trachea, lung and pleura, names of paranasal air sinuses.
6. Peritoneum
    a. Description in brief.
7. Urinary system
    a. Kidney, ureter, urinary bladder, male and female urethra. Histology of kidney, ureter and urinary bladder.
8. Reproductive system
    a. Parts of male reproductive system; testis, vas deferens, epididymis, prostate (gross & histology). Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology). Mammary gland: gross.
9. Endocrine glands
    a. Endocrine glands: pituitary gland, thyroid gland, parathyroid gland, suprarenal glad (gross & histology).
10. Nervous system
    a. Neuron, classification of nervous system, cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), meninges, ventricles & cerebrospinal fluid, names of basal nuclei, blood supply of brain, cranial nerves.
    b. Sympathetic trunk & names of parasympathetic ganglia.
11. Sensory organs
    a. Skin: histology, appendages of skin.
    b. Eye: parts of eye & lacrimal apparatus. Extra-ocular muscles & nerve supply.
    c. Parts of ear: external, middle and inner ear and contents.
12. Embryology:
    a. Spermatogenesis & oogenesis.
    b. Ovulation, fertilization.
    c. Fetal circulation.
    d. Placenta.

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Human Physiology (90 Hours)

1. Blood
    a. Introduction: composition and function of blood.
    b. Red blood cells: erythropoiesis, stages of differentiation, function, count, physiological variation.
    c. Structure, function, concentration, physiological variation, methods of estimation of hemoglobin.
    d. White blood cells: production, function, life span, count, differential count.
    e. Platelets: origin, normal count, morphology functions.
    f. Plasma proteins: production, concentration, types, functions, albumin, globulin, fibrinogen, prothrombin.
    g. Hemostasis: definition, normal hemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.
    h. Blood bank:
    i. Blood groups: ABO system, Rh system.
    j. Blood grouping & typing, cross matching.
    k. Rh system: Rh factor, Rh incompatibility.
    l. Blood transfusion: indication, universal donor and recipient concept.
    m. Selection criteria of a blood donor, transfusion reactions.
    n. Anticoagulants: classification, examples and uses.
    o. Anemias: morphological and etiological classification, effects of anemia on body.
    p. Blood indices: colour index, MCH, MCV, and MCHC.
    q. Erythrocyte sedimentation rate (ESR) and packed cell volume, normal values, definition, determination.
    r. Blood volume: normal value, determination of blood volume and regulation of blood volume.
    s. Body fluid: pH, normal value, regulation and variation.
    t. Lymph: lymphoid tissue formation, circulation, composition and function of lymph.
2. Cardiovascular system
    a. Heart: physiological anatomy, nerve supply.
    b. Properties of cardiac muscle, cardiac cycle: systole, diastole. Intra-ventricular pressure curves.
    c. Cardiac output (only definition).
    d. Heart sounds, normal heart sounds, areas of auscultation.
    e. Blood pressure: definition, normal value, clinical measurement of blood pressure.
    f. Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension.
    g. Pulse: jugular, radial pulse, triple response.
    h. Heart sounds: normal heart sounds, causes, characteristics and significance, heart rate.
    i. Electrocardiogram (ECG) significance.

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3. Digestive System
    a. Physiological anatomy of gastrointestinal tract, functions of digestive system.
    b. Salivary glands: structure and functions, deglutition: stages and regulation.
    c. Stomach: structure and functions.
    d. Gastric secretion: composition function regulation of gastric juice secretion.
    e. Pancreas: structure, function, composition, regulation of pancreatic juice.
    f. Functions of liver. Bile secretion, composition, function, regulation of bile secretion, bilirubin metabolism, types of bilirubin, Vandenberg reaction, jaundice: types, significance.
    g. Functions of gall bladder.
    h. Small intestine: functions, digestion, absorption, movements.
    i. Large intestine: functions, digestion and absorption of carbohydrates, proteins, fats, lipids, defecation
4. Respiratory system
    a. Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract, respiratory muscles.
    b. Respiratory organs: lungs, alveoli, respiratory membrane, stages of respiration.
    c. Mechanism of normal and rigorous respiration, forces opposing and favoring expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall.
    d. Transportation of respiratory gases: transportation of oxygen: direction, pressure gradient, forms of transportation, oxygenation of Hb. Quantity of oxygen transported. Lung volumes and capacities
    e. Regulation of respiration: mechanisms of regulation, nervous and chemical regulation, respiratory center, Hering–Breuer reflex.
    f. Applied physiology and respiration: hypoxia, cyanosis, asphyxia, dyspnea, dysbarism, artificial respiration, and apnea.
5. Endocrine System
    a. Definition, classification of endocrine glands & their hormones, properties of hormones.
    b. Thyroid gland hormone: physiological anatomy, hormone secreted, physiological function, regulation of secretion, disorders: hypo and hyper secretion of hormone.
    c. Adrenal cortex: physiological anatomy of adrenal gland, adrenal cortex, cortical hormones, functions and regulation.
    d. Adrenal medulla: hormones, regulation and secretion. Functions of adrenaline and nor adrenaline.
    e. Pituitary hormones: anterior and posterior pituitary hormones, secretion, function.
    f. Hormones of pancreas.
    g. Insulin: secretion, regulation, function and action.
    h. Diabetes mellitus: regulation of blood glucose level.
    i. Parathyroid gland: function, action, regulation of secretion of parathyroid hormone.
    j. Calcitonin; function and action.

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6. Special senses
    a. Vision: structure of eye, function of different parts.
    b. Structure of retina.
    c. Hearing: structure and function of ear, mechanism of hearing.
    d. Taste buds: functions.
    e. Smell: physiology, receptors.
7. Nervous system
    a. Functions of nervous system, neuron: structure, classification and properties.
    b. Neuroglia, nerve fiber, classification, conduction of impulses continuous and saltatory.
    c. Velocity of impulse transmission and factors affecting.
    d. Synapse: structure, types, properties.
    e. Receptors: definition, classification, properties.
    f. Reflex action: unconditioned properties of reflex action. Babinski's sign.
    g. Spinal cord nerve tracts. Ascending tracts, descending tracts.
    h. Pyramidal tracts
        i. Extrapyramidal tracts, functions of medulla, pons, hypothalamic disorders.
        ii. Cerebral cortex lobes and functions, sensory cortex, motor cortex, cerebellum, functions of cerebellum. Basal ganglion: functions. EEG.
        iii. Cerebro Spinal Fluid (CSF): formation, circulation, properties, composition and functions.
        iv. Lumbar puncture.
    i. Autonomic Nervous System:
        i. Sympathetic and parasympathetic distribution and functions and comparison of functions.
8. Excretory System
    a. Functions of kidneys, nephron, vasa recta, cortical and juxtamedullary nephrons, comparison, juxta glomerular apparatus: structure and function. Renal circulation peculiarities.
    b. Mechanism of urine formation: ultrafiltration criteria for filtration, GFR, plasma fraction,
    c. GFR, factors effecting GFR. Determination of GFR selective reabsorption –sites of reabsorption, substance reabsorbed, mechanisms of reabsorption of glucose, urea, H^+, Cl^-, amino acids etc. TMG, tubular load, renal threshold % of reabsorption of different substances, selective secretion.
    d. Properties and composition of normal urine, urine output. Abnormal constituents in urine, mechanism of urine concentration. Counter-current mechanisms: micturition, innervation of bladder, cystometrogram.
    e. Diuretics: water, diuretics, osmotic diuretics, artificial kidney, renal function tests: plasma clearance, actions of ADH, aldosterone and PTH on kidneys.
    f. Renal function tests.

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9. Reproductive system
    a. Function of reproductive system, puberty.
    b. Male reproductive system: functions of testes, spermatogenesis: site, stages, factors influencing, semen. Endocrine functions of testes.
    c. Androgens: testosterone structure and functions.
    d. Female reproductive system: ovulation, menstrual cycle: physiological changes during pregnancy, pregnancy test.
    e. Lactation: composition of milk, factors controlling lactation.

10. Muscle nerve physiology
    a. Classification of muscle, structure of skeletal muscle, sarcomere contractile proteins, neuromuscular junction. Transmission across neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue, rigor mortis.

11. Skin
    a. Structure and function, body temperature measurement, physiological variation, regulation of body temperature by physical chemical and nervous mechanisms. Role of hypothalamus, hypothermia and fever.

Biochemistry (90 Hours)

1. Specimen collection:
    a. Pre-analytical variables.
    b. Collection of blood.
    c. Collection of CSF & other fluids.
    d. Urine collection.
    e. Use of preservatives.
    f. Anticoagulants.
2. Introduction to laboratory apparatus
    a. Pipettes: different types (graduated, volumetric, Pasteur, automatic etc.).
    b. Calibration of glass pipettes.
    c. Burettes, beakers, petri dishes, depression plates.
    d. Flasks: different types (volumetric, round bottomed, Erlenmeyer conical etc.).
    e. Funnels: different types (conical, Buchner etc.).
    f. Bottles: reagent bottles – graduated and common, wash bottles – different type specimen bottles
3. Measuring cylinders, porcelain dish
    a. Tubes: test tubes, centrifuge tubes, test tube draining rack.
    b. Tripod stand, wire gauze, Bunsen burner.
    c. Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range. Cuvette holder racks: bottle, test tube, pipette, desiccator, stop watch, timers, scissors.
    d. Dispensers: reagent and sample.
    e. Maintenance of lab glass ware and apparatus.
    f. Glass and plastic ware in laboratory.

g. Use of glass: significance of boro silicate glass, care and cleaning of glass ware, different cleaning solutions of glass.
h. Care and cleaning of plastic ware, different cleaning solution.

4. Instruments (Theory and demonstration) Diagrams to be drawn
   a. Use, care and maintenance of: water bath, oven & incubators, water distillation plant, water deionizers, refrigerators, cold box, deep freezers, reflux condenser, centrifuge, balances, colorimeter, spectrophotometer, pH meter and electrodes.
   b. Centrifuges: definition, principles, Svedberg unit, centrifugal force, centrifugal field, RPM, conversion of G to RPM and vice versa, different types of centrifuges.
   c. Manual balances: single pan, double pan, triple balance, direct read out electrical balances.
   d. Guideline to be followed and precautions to be taken while weighing. Weighing different types of chemicals, liquids, hygroscopic compounds etc.
   e. Colorimeter, spectrophotometer, pH meter, electrodes, salt bridge solution: principles, parts, types, guidelines to be followed and precautions to be taken while using.

5. Safety of measurements
6. Conventional and SI units
7. Atomic structure
   a. Dalton's theory, properties of electrons, protons, neutrons, and nucleus, Rutherford's model of atomic structure, Bohr's model of atomic structure, orbit and orbital quantum numbers, Heisenberg's uncertainly principle. Electronic configuration, Aufbau principle.
   b. Pauli's exclusion principle, etc.
   c. Valency and bonds: different types of strong and weak bonds in detail with examples.
   d. Theory & Practical for all the following under this section: molecular weight, equivalent weight of elements and compounds, normality, molarity. Preparation of molar solutions (mole/liter solution) e.g.: 1 M NaCl, 0.15 M NaCl, 1 M NaOH, 0.1 M HCl, 0.1 M H2S04 etc.
   e. Preparation of normal solutions: e.g., 1N Na2CO3, O.1N Oxalic acid, 0.1 N HCl, 0.1N H2SO4, 0.66 N H2S04 etc., percent solutions. Preparation of different solutions: v/v w/v (solids, liquids and acids). Conversion of a percent solution into a molar solution.

8. Dilutions
   a. Diluting solutions: e.g. preparation of 0.1 N NaCl from 1 N NaCl & from 2N NaCl etc., preparing working standard from stock standard, body fluid dilutions, reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc., saturated and supersaturated solutions. Technique for preparation of standard solutions e.g.: glucose, urea, etc., significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, preparation of standard solutions of deliquescent compounds (CaCl2, potassium carbonate, sodium hydroxide etc.). Preparation of standards using conventional and SI unit's acids, bases, salts and indicators.

9. Acids and Bases
    a. Definition, physical and chemical properties with examples. Arrhenius concept of acids and bases, Lowry – Bronsted theory of acids and bases. Classification of acids and bases.
    b. Differences between bases and alkali, acidity and basicity, monoprotic and polyprotic acids and bases. Concepts of acid base reaction, hydrogen ion concentration, ionization of water, buffer, and pH value of a solution.
    c. Preparation of buffer solutions using pH meter. Salts: definition, classification, water of crystallization, definition and different types, deliquescent and hygroscopic salts.

10. Acid- base indicators:
    a. Definition, concept, mechanism of dissociation of an indicator, color change of an indicator in acidic and basic conditions, use of standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators and their pH range, suitable pH indicators used in different titrations, universal indicators.

11. Quality control
    a. Accuracy, precision. Specificity, sensitivity, limits of error allowable in laboratory, percentage error.
    b. Normal values and Interpretations.

12. Special Investigations
    a. Serum electrophoresis, immunoglobulins, drugs: digitoxin, theophylline, regulation of acid base status, Henderson Hassel Bach equations, buffers of the fluid, pH regulation, disturbance in acid base balance, anion gap, metabolic acidosis, metabolic alkalosis, respiratory acidosis, respiratory alkalosis, basic principles and estimation of blood gases and pH, basic principles and estimation of electrolytes, water balance, sodium regulation, bicarbonate buffers, nutrition, nutritional support with special emphasis on parental nutrition, calorific value, nitrogen balance, respiratory quotient, basal metabolic rate, dietary fibers, nutritional importance of lipids, carbohydrates and proteins, vitamins.

13. Carbohydrate- properties, metabolism of fructose, Glycolysis, TCA cycle, Gluconeogenesis and its biological importance
14. Lipid- properties, metabolism and its biological importance
15. Protein - properties, metabolism, degradation of fatty acids and its biological importance
16. Nucleoproteins- chemistry, structure and function
17. Hemoglobinopathies- structure, properties and abnormal Hb
18. Enzymes- definition, classification, coenzymes, factors affecting their action, enzyme inhibition, enzymes of clinical importance.
19. Vitamins- classification, functions, source, deficiency manifestations and hypervitaminoses.
20. Bioenergetics – Importance of ATP, Mitochondria, biological oxidation, respiratory chain
21. Minerals – Ca2+, phosphorous, Na+ , Cl- , iron, Iodine and copper, water and electrolytes
22. Organ function tests – Liver function test, Renal Function test.

Introduction to Dialysis Therapy (45 Hours)

1. Kidney Diseases Basics AKI & CKD
2. Hemodialysis (HD)
    a. History of dialysis
    b. Define Hemodialysis
    c. Components of hemodialysis apparatus
    d. Mechanisms of hemodialysis
3. Peritoneal Dialysis (PD)
    a. History of Peritoneal Dialysis
    b. Define peritoneal dialysis.
    c. Components of peritoneal dialysis apparatus.
    d. Mechanisms of peritoneal dialysis.
4. Renal Transplantation
    a. History of organ transplantation (including Kidney)
    b. List & Define organ/tissue transplantation.
    c. Define kidney transplantation.
5. Normal Kidney & Dialysis
    a. Compare the normal kidney functions with dialysis.
    b. Indications for dialysis.
    c. Compare HD & PD
6. Conservative management
    a. Define conservative management & Palliative care.
    b. Methods of conservative management.
    c. Importance of conservative management.
    d. Palliative care for ESRD.
7. Introduction to Dialysis Unit
    a. Various areas in the dialysis unit and their importance
    b. Staff, job responsibilities
    c. Protocol to establish a dialysis unit.

Anatomy Practical's (60 Hours)

1. Introduction: Human body as a whole
    a. Histology of types of epithelium.
    b. Histology of serous, mucous & mixed salivary gland.
2. Locomotion and support
    a. Histology of the 3 types of cartilage.
    b. Demo of all bones showing parts, radiographs of normal bones & joints.
    c. Histology of compact bone (TS & LS).
    d. Demonstration of all muscles of the body.
    e. Histology of skeletal, smooth & cardiac muscle (TS & LS).

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3. Cardiovascular system
    a. Demonstration of heart and vessels in the body.
    b. Histology of large artery, medium sized artery & vein, large vein.
    c. Histology of lymph node, spleen, tonsil & thymus.
    d. Normal chest radiograph showing heart shadows.
    e. Relationship to vascular access in dialysis
4. Gastro-intestinal system
    a. Demonstration of parts of gastrointestinal system.
    b. Normal radiographs of gastrointestinal system.
    c. Histology of gastrointestinal system.
5. Respiratory system
    a. Demonstration of parts of respiratory system.
    b. Normal radiographs of chest.
    c. Histology of lung and trachea.
6. Peritoneum
    a. Demonstration of reflections.
7. Urinary system
    a. Demonstration of parts of urinary system.
    b. Histology of kidney, ureter, urinary bladder.
    c. Radiographs of abdomen-IVP, retrograde cystogram.
8. Reproductive system
    a. Demonstration of section of male and female pelvis with organs in situ.
    b. Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tube, ovary.
9. Endocrine glands
    a. Demonstration of the glands.
    b. Histology of pituitary, thyroid, parathyroid, suprarenal glands.
10. Nervous system
    a. Histology of peripheral nerve & optic nerve.
    b. Demonstration of all plexuses and nerves in the body.
    c. Demonstration of all parts of brain.
    d. Histology of cerebrum, cerebellum, spinal cord.
11. Sensory organs
    a. Histology of thin and thick skin.
    b. Demonstration and histology of eyeball.
    c. Histology of cornea & retina.
12. Embryology.
    a. Demonstration of models.

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Physiology Practical's (60 Hours)

1. Hemoglobinometry.
2. White blood cell count.
3. Red blood cell count.
4. Determination of blood groups.
5. Leishman's staining and differential WBC count.
6. Determination of packed cell Volume.
7. Erythrocyte sedimentation rate (ESR).
8. Calculation of blood indices.
9. Determination of clotting time, bleeding time.
10. Blood pressure recording.
11. Auscultation for heart sounds.
12. Artificial respiration.
13. Determination of vital capacity.

Biochemistry Practical's (60 Hours)

1. Analysis of normal urine.
2. Composition of urine.
3. Procedure for routine screening.
4. Urinary screening for inborn errors of metabolism.
5. Common renal disease.
6. Urinary calculus.
7. Urine examination for detection of abnormal constituents.
8. Interpretation and diagnosis through charts.
9. Liver function tests.
10. Lipid profile.
11. Renal function test.
12. Cardiac markers.
13. Blood gas and electrolytes.
14. Estimation of blood sugar, blood urea, serum creatinine and electrolytes.
15. Demonstration of strips, demonstration of glucometer.
16. Titration of a simple acid and a base /preparation of standard solution of oxalic acid and using this solution finding out the normality of a sodium hydroxide solution. Acid to be titrated using this base Calculation of normality of an acid or a base after titration, measurement of hydrogen ion concentration.

Community orientation and clinical visit (CT) (90 Hours)

The objective of this particular section of the foundation course is to sensitize potential learners with essential knowledge; this will lay a sound foundation for their learning across the under-graduate program and across their career. Innovative teaching methods should be used to ensure the attention of a student and make them more receptive such as group activities, interactive fora, role plays, and clinical bed-side demonstrations.

1. The community orientation and clinical visit will include a visit to the entire chain of healthcare delivery systems -Sub center, PHC, CHC, SDH, DH and Medical college, private hospitals, dispensaries and clinics.

2. The student will also be briefed regarding governance at village level including interaction and group discussion with village panchayat and front-line health workers.
3. Clinical/ OPD visit to their respective professional departments within the hospital.

Second Semester

Pathology (60 Hours)

1. Introduction to pathology & basic terminologies

Terminologies

1. Introduction to pathology
2. Recognize the relevance of Pathology
3. Define the basic terminologies and branches of Pathology
    a. Aactuology
    b. Pathogenesis
    c. Pathological and clinical manifestations
    d. Complications & sequelae
    e. Prognosis
    f. Syndrome
    g. Lesion
4. Explain the scope of the following branches of pathology:
    a. Histopathology
    b. Cytopathology
    c. Hematology

2. Cell injury & adaptation

Cell adaptation

Define cell growth, differentiation and cell. adaptation

Describe the various cell adaptations with examples.

a. Hypertrophy
b. Hyperplasia
c. Atrophy
d. Metaplasia
e. Dysplasia

Necrosis

1. Define necrosis
2. Describe the various types of necrosis with clinical examples
    a. Coagulative necrosis
    b. Colliquative necrosis/ Liquefactive necrosis
    c. Caseous necrosis
    d. Fibrinoid necrosis
    e. Fat necrosis
    f. Gangrene

3. Inflammation

Define inflammation. List the types with examples.

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Acute inflammation

1. Define acute inflammation.
2. Describe the causes and cardinal signs of acute inflammation
3. Explain the vascular of acute inflammation.
4. Describe the cellular events in acute inflammation.
5. Explain the sequelae of acute inflammation.
6. Explain the beneficial, harmful and systemic effects of acute inflammation.

Chronic inflammation

1. Define chronic inflammation.
2. List the causes of chronic inflammation.
3. Describe the macroscopic and microscopic features in chronic inflammation.
4. List the cells in chronic inflammation.
5. Define granulomatous inflammation.
6. List the components of a granuloma and describe its morphology
7. List the causes of granulomatous inflammation.

4. Healing & repair

Wound healing

1. Define granulation tissue and describe the formation of granulation tissue.
2. Describe the following:
    a. Healing by first intention.
    b. Healing by second intention.
    c. Wound organization, contraction and scarring.
3. Explain the factors which modify (influence) healing and repair.

5. Fluid Hemodynamics

Oedema

1. Define oedema.
2. List the types of oedema.
3. Describe the pathogenesis and clinical features of the different types of oedema.

Shock

1. Define shock.
2. List the various types of shock.
3. Describe the pathogenesis of septic and hypovolemic shock.

Thrombosis (Arterial & Venous)

1. Define thrombosis.
2. Describe the factors influencing pathogenesis of thrombosis.
3. List causes of arterial and venous thrombosis.
4. List the fates of thrombus.

Embolism

1. Define embolism. List the types of embolism with examples.
2. Describe the clinicopathologic consequences of pulmonary thromboembolism

Infarction

1. Define infarction.
2. Describe the types and clinical significance of infarction.

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6. Neoplasia
   1. Define neoplasia.
   2. Describe the nomenclature of tumors with examples
   3. Define dysplasia and anaplasia
   4. Describe the differences between benign and malignant tumors
   5. Define carcinogenesis. List the types of carcinogens with example of each
   6. Describe the aetiology & predisposing factors of tumors
   7. Define metastasis.
   8. Describe the routes of metastasis with examples
   9. Describe the prognostic factors of tumors with emphasis on staging & grading
   10. Describe the various modalities for diagnosis of cancer
7. Infectious diseases

   Tuberculosis
   1. Describe the aetiology and mode of transmission of tuberculosis
   2. Describe the clinical features of tuberculosis.
   3. Describe the morphology of primary, secondary and miliary tuberculosis.

   Leprosy
   1. List the aetiological factors of leprosy
   2. Classify leprosy
   3. Describe the morphology of lepromatous and tuberculoid leprosy
8. Genetics
   1. Describe the basic concepts of genetics
   2. Define with suitable examples
      a. Autosomal dominant
      b. Autosomal recessive
      c. X-linked recessive
      d. Chromosomal abnormalities
   3. Define karyotyping
9. Blood vessels & heart

   Hypertension
   1. Define hypertension
   2. Classify hypertension
   3. Describe the effects of hypertension on various organs

   Atherosclerosis
   1. Define atherosclerosis
   2. List the sites of involvement by atherosclerosis
   3. Describe the predisposing factors, complications & clinical effects of atherosclerosis

   Ischemic heart disease/coronary artery disease
   1. Define ischemic heart diseases
   2. Describe the clinical spectrum of the disease (with reference to angina and myocardial infarction

   Aneurysm
   1. Define aneurysm
   2. List the causes, types and complications of aneurysms

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Rheumatic heart disease

1. Define rheumatic heart diseases
2. Describe its aetiology & clinical features

Cardiac failure

1. Define cardiac failure
2. List the causes of cardiac failure
3. Describe its pathophysiology & clinical features

10. Respiratory system

Pneumonia

1. Define pneumonia
2. List the types of pneumonia
3. Describe the aetiology and clinical features of pneumonia

Chronic obstructive airway disease

1. Define chronic obstructive airway disease.
2. List the types of chronic obstructive airway Disease.

Emphysema

1. Define emphysema
2. List the types of emphysema
3. Describe the aetiology and clinical features of emphysema

Chronic bronchitis

1. Define chronic bronchitis
2. Describe the aetiology and clinical features of chronic bronchitis

Bronchiectasis

1. Define bronchiectasis
2. List the types of bronchiectasis.
3. Describe the aetiology and clinical features of bronchiectasis

Asthma

1. Define asthma
2. List the types of asthma
3. Describe the aetiology and clinical features of asthma

Pneumoconiosis

1. Define pneumoconiosis
2. List the types of pneumoconiosis
3. Describe the aetiology and clinical features of pneumoconiosis

11. Gastrointestinal tract & liver

Gastric & duodenal ulcers

1. Definition gastric and duodenal ulcer
2. Describe the aetiology, gross pathology and clinical features of gastric and duodenal ulcer

GIT malignancies

1. List the types of common GIT malignancies
2. Describe their predisposing factors & clinical features

Jaundice

1. Define jaundice
2. List the types of jaundice with examples

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Viral hepatitis

1. Describe the aetiology of viral hepatitis
2. List the modes of infection
3. Describe the clinical features of viral hepatitis

Cirrhosis of liver

1. Define cirrhosis
2. List the causes of cirrhosis

Liver failure

1. Define liver failure
2. List the causes of liver failure
3. Describe its pathophysiology & clinical features

12. Renal system

Define nephrotic syndrome & nephritic syndrome with suitable examples

Renal failure

1. Define renal failure
2. List its types & describe the clinical features

13. Endocrine system

1. Define hyperthyroidism & hypothyroidism
2. Describe the causes, clinical features and laboratory diagnosis of hyperthyroidism and hypothyroidism
3. Describe the types, causes & clinical features of goiter
4. Describe types, clinical features, complications & laboratory diagnosis of diabetes

14. Nervous system

1. Define Cerebrovascular diseases
2. Describe its causes and clinical features

15. Musculoskeletal system

Fracture

1. Define fracture
2. List the types of fracture
3. Describe the process of fracture healing
4. List the factors influencing fracture repair

Osteomyelitis

1. Define osteomyelitis
2. Describe the aetiology, types and clinical features of osteomyelitis
3. Define and list the clinical features of Rheumatoid arthritis

16. Histopathology

1. Introduction to histopathology.
2. Receiving of specimen in the laboratory.
3. Grossing techniques.
4. Mounting techniques: various mountants.
5. Maintenance of records and filing of the slides.
6. Use & care of microscope.
7. Various fixatives, mode of action, preparation and indication.
8. Section cutting.
9. Tissue processing for routine paraffin sections.

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10. Decalcification of tissues.
11. Staining of tissues: H & E Staining.
12. Bio-medical waste management.

17. Clinical Pathology

1. Introduction to clinical pathology.
2. Collection, transport, preservation, and processing of various clinical specimens.
3. Urine Examination: collection and preservation of urine, physical, chemical, microscopic examination.
4. Examination of body fluids.
5. Examination of cerebro spinal fluid (CSF).
6. Sputum examination.
7. Examination of faeces.

18. Hematology

1. Introduction to hematology.
2. Normal constituents of blood, their structure and function.
3. Collection of blood samples.
4. Anticoagulants used in hematology.
5. Instruments and glassware used in hematology, preparation and use of glassware.
6. Laboratory safety guidelines.
7. SI units and conventional units in hospital laboratory.
8. Hb, PCV.
9. ESR.
10. Normal hemostasis.
11. Bleeding time, clotting time, prothrombin time, activated partial thromboplastin time.

19. Blood Bank

1. Introduction.
2. Blood grouping and Rh types.
3. Cross matching.

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Microbiology (60 Hours)

1. Introduction To Medical Microbiology, Virology, Mycology & Parasitology
2. Morphology
   a. Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.
3. Growth and nutrition
   a. Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.
4. Culture media
   a. Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.

2. Sterilization and Disinfection
    a. Principles and use of equipment of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, antiseptic and disinfectants.
5. Immunology
    a. Immunity, vaccines, types of vaccine and immunization schedule, principles and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA.
    b. Rapid tests for HIV and HBsAg (excluding technical details).
6. Systematic Bacteriology
    a. Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (excluding classification, antigenic structure and pathogenicity), Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, *E. coli*, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes.
7. Parasitology
    a. Morphology, life cycle, laboratory diagnosis of following parasites: *E. histolytica*, Plasmodium, tape worms, Intestinal nematodes.
8. Mycology
    a. Morphology, diseases caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi
10. Virology
    a. General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.
11. Hospital infection
    a. Causative agents, transmission methods, investigation, prevention and control of hospital infection.
12. Principles and practice Biomedical waste management

General Pharmacology (60 Hours)

1. General Pharmacology
    a. Introduction
    b. Routes of drug administration
    c. Pharmacokinetics
    d. Pharmacodynamics
    e. Drug toxicity and safety
2. Autonomic nervous system including skeletal muscle relaxants.
    a. Cholinergic drugs
    b. Anticholinergic drugs:
    c. Neuromuscular blocking drugs
    d. Adrenergic drugs
    e. Adrenergic receptor antagonists

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3. Central nervous system
    a. General anesthetics (GAs)
    b. Local anesthetics (LAs)
    c. Sedative & hypnotics
    d. Opioids
    e. NSAIDs
    f. Drug treatment of rheumatoid arthritis (RA)
    g. Drug treatment of gout:
    h. Psychopharmacology
    i. Parkinsonism
    j. Alcohol
    k. Antiepileptic drugs
4. GIT
    a. Drugs for peptic ulcer
    b. Antiemetics
    c. Laxatives and antidiarrheals
5. Blood
    a. Hematinic
    b. Anticoagulants
    c. Antiplatelet drugs
    d. Fibrinolytics and antifibrinolytics
6. Cardiovascular system
    a. Diuretics
    b. Drugs used in congestive heart failure (CHF)
    c. Antihypertensives
    d. Antianginal drugs
    e. Hypolipidemic
7. Respiratory System
    a. Pharmacotherapy of bronchial asthma
    b. Pharmacotherapy of cough
    c. Antihistaminic
8. Chemotherapy
    a. General aspects
    b. Beta lactam antibiotics
    c. Cotrimoxazole
    d. Macrolides
    e. Fluoroquinolones
    f. Antifungal agents
    g. Antiviral drugs
    h. Antitubercular drugs
    i. Antileprotic drugs
    j. Aminoglycosides
    k. Antiamoebic drugs
    l. Anthelmintics
    m. Antimalarial drugs

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9. Hormones and related drugs
    a. Glucocorticoids
    b. Antidiabetic drugs
    c. Thyroid and anti-thyroid drugs
10. Immunosuppressors and Immunomodulators

Applied anatomy & physiology related to Dialysis Therapy (60 Hours)

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 including concept of abdominal hernias.
6. Anatomy of vascular system:
    a. Upper limb vessels: course, distribution, branches, origin & abnormalities.
    b. Neck vessels: course, distribution, branches, origin & abnormalities.
    c. Femoral vessels: course, distribution, branches, origin & abnormalities.
    d. Artery & Veins used for dialysis.
7. Histology of bladder, urethra
8. Innervation of urinary bladder

Physiology

1. Mechanism of urine formation.
2. Glomerular filtration rate (GFR).
3. Clearance studies.
4. Physiological values of urea, creatinine, electrolytes, calcium, phosphorous, uric acid, magnesium, glucose; 24 hours urinary indices – urea, creatinine, electrolytes, calcium, magnesium.
5. Physiology of renal circulation
    a. Factors contributing & modifying renal circulation.
    b. Auto regulation.
6. Hormones produced by kidney & physiologic alterations in pregnancy.
7. Haemostasias: coagulation cascade, coagulation factors, auto regulation, BT, CT, PT, PTT, thrombin time.
8. Acid base balance: basic principles & common abnormalities like hypokalemia, hyponatremia, hyperkalemia, hypernatremia, hypocalcemia, hypercalcemia, pH, etc.
9. Basic nutrition in renal diseases.
10. Basics of ECG, ECHO
11. Juxta Glomerular Apparatus
12. Micturition reflux

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Fundamentals of Dialysis Therapy (45 Hours)

1. Indications of dialysis.
2. Types of dialysis.
   List the types of Hemodialysis
   List the types of Peritoneal dialysis
3. Principles of Hemodialysis
   Define Hemodialysis Principles
   Discuss the application of diffusion in HD and list the factors affecting diffusion
   Discuss ultrafiltration and convection in hemodialysis and factors affecting them
   List the factors affecting solute clearance in HD
   Define Kuf & KoA
4. Principles of Peritoneal Dialysis
   Define Peritoneal Dialysis Principles
   Discuss the application of diffusion in PD and list the factors affecting diffusion
   Discuss ultrafiltration/ Osmosis, convection and fluid absorption in Peritoneal Dialysis and factors affecting them
   List the factors affecting solute clearance in PD
5. Hemodialysis Apparatus
   Vascular Access
   Water Treatment Plant
   Extracorporeal Blood Circuit
   HD machine
   Dialysate
6. Basics of Semipermeable membrane & Peritoneal Membrane
   Define semipermeable membrane
   List the properties of a semipermeable membrane
   List the importance of biological semipermeable membrane
   List the importance of semipermeable membrane in the field of dialysis – HD & PD
   Define biocompatibility and explain its importance in the dialysis field
   Discuss the factors affecting the permeability of the semipermeable membrane in HD & PD
7. Peritoneal Dialysis Apparatus.
   PD Access
   PD fluid
   PD Cyclers
8. Introduction to hemodialysis machine.
   Electronics Circuit
   Hydraulics Circuit
   Alarms in HD machine
9. Priming of dialysis apparatus.
   Purpose
   Assembling
   Steps for priming HD apparatus.

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10. Dialyzer reuse.
    Chemicals Used
    Purpose
    Advantages and Disadvantages
    Steps involved in reuse
11. Common complications of hemodialysis.
12. Monitoring patients during dialysis.

Pathology Practical's (30 Hours)

1. Urine Examination: physical, chemical, microscopic.
2. Blood grouping Rh typing.
3. Hb estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR).
4. Bleeding time, clotting time.
5. Histopathology: section cutting and H &E staining.
   Renal Biopsy Slides

Microbiology Practical's (30 Hours)

1. Compound microscope.
2. Demonstration of sterilization equipment's: hot air oven, autoclave, bacterial filters.
3. Demonstration of commonly used culture media, nutrient broth, nutrient agar, blood agar, chocolate agar, MacConkey medium, L J media, Robertson cooked meat media, Potassium tellurite media with growth, MacConkey medium with LF & NLF, NA with staph.
4. Anaerobic culture methods.
5. Antibiotic susceptibility test.
6. Demonstration of common serological tests: Widal, VDRL, ELISA.
7. Gram staining.
8. Acid fast staining.
9. Fungal Staining
10. Stool exam for helminthic ova & cysts.
11. Visit to hospital for demonstration of work done by infection control team and biomedical waste management department.

Applied Anatomy & Physiology related to dialysis therapy practical's (30 Hours)

Applied Anatomy

1. Urinary system
   e. Demonstration of parts of urinary system.
   f. Histology of kidney, ureter, urinary bladder.
   g. Radiographs of abdomen-IVP, retrograde cystogram.
   b. Development of Kidney
   c. Peritoneum
      a. Demonstration of reflections.

d. Anatomy of vascular system:
    a. Upper limb vessels.
    b. Neck vessels
    c. Femoral vessels
    d. Artery & Veins used for dialysis.

Applied Physiology

1. Estimation of GFR
2. Hemoglobinometry.
3. Determination of clotting time, bleeding time.
4. Blood pressure recording.
5. Auscultation for heart sounds.
6. Interpretation of ECG & ECHO

Fundamentals of Dialysis Therapy Practical's (30 Hours)

1. HD Apparatus Spotters
   Vascular Access
   Water Treatment Plant
   Extracorporeal Blood Circuit
   HD machine
   Dialysate
2. Priming of Dialysis Apparatus
   Assembling
   Steps for priming HD apparatus
3. Dialyzer reuse
   Steps involved in reuse
4. Monitoring during dialysis
   Patient Monitoring
   Vitals
5. Managing complications during dialysis.
6. Understanding Dialysis Blood Circuit.

Clinical Postings- I (135 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills.

Areas to be covered.

1. OPD
2. Dialysis Unit
3. Procedure room for assisting in Renal Biopsy.

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Third Semester

Sociology in Health Care (45 Hours)

1. Introduction to medical sociology
    a. Definition, objectives, principles, scope, and its relevance to patient care.
    b. Difference between sociology of medicine and sociology in medicine.
    c. Historical development of medical sociology.
    d. Sociological perspectives of health and illness.
2. Social Patterning of health
    a. Social Class
    b. Gender
    c. Ethnicity
    d. Age
    e. Place
    f. Health and development
    g. Marital and Cultural Factors
    h. Psycho-Social Factors
    i. Social
    j. Life Events
    k. Life Course
3. Social epidemiology
    a. Definitions, socio-cultural factors bearing on health in India.
    b. Common occupational diseases and prevention of occupational diseases.
4. Health profession and organization
    a. Medical social service in a hospital
    b. Hospital as a social organization.
    c. Professional qualities of a physician.
5. Principles of sociology
    a. Definition, objectives
    b. Nature and scope of sociology
    c. Origin and Nature of society.
    d. Social groups – characteristics and functions
    e. Social control
    f. Culture and civilization
6. Sociology of health and hospital management
    a. Health, development, and care
    b. Third world countries health
    c. Challenges of health and health care administration.

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Biomedical Waste Management (30 Hours)

Bio medical waste management and environment safety- The aim of this section will be to help prevent harm to workers, property, the environment, and the general public. Topics to be covered under the subject are as follows:

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
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)
9. Acts/Law of BMW
10. HAZMAT

Pathophysiology of Kidney Diseases (75 Hours)

1. Acute Kidney Injury.
2. Glomerular pathology Primary and Secondary
3. Renal biopsy
4. Nephrotic syndrome – primary & secondary.
5. Nephritic syndrome.
6. UTI (urinary tract infections.)
7. Asymptomatic urinary abnormalities.
8. Chronic Kidney Diseases.
9. Renal stone diseases.
10. Obstructive uropathies.
11. Congenital abnormalities of urinary system
12. Inherited renal diseases.
13. Tumors of kidney & Urinary Bladder.
14. Pregnancy associated renal diseases.
15. Renal vascular disorders & hypertension associated renal diseases.
16. Tubulo-interstitial diseases.
17. Renal vascular disorders.
18. Pathology of kidney in hypertension, diabetes mellitus.
19. Pathology of peritoneum, peritonitis, bacterial, tubular & sclerosing peritonitis, dialysis induced changes.
20. Renal Tuberculosis
21. Hepatotropic viruses in detail: mode of transfusion, universal precautions vaccinations.
22. Human immunodeficiency virus (HIV), mode of transfusion, universal precautions & HIVAN.
23. Opportunistic infections.

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24. Microbiology of vascular access infection (femoral, jugular, subclavian catheters).
25. Sampling methodologies for culture & sensitivity.
26. Reflux Nephropathy
27. Basic tropical disease

Instrumentation Specific to Dialysis Therapy (75 Hours)

1. Equipment's used in Hemodialysis.
    a. HD machine -Components and function
    b. HD machine – Blood Circuit
    c. HD machine – Dialysate circuit
    d. Cleaning and disinfection of HD machine
    e. OCM
    f. Trouble shooting equipment related problems during HD.
2. Water treatment System
    a. Purpose of water treatment
    b. AAMI and ISO standards for RO water.
    c. Filtration
    d. Softener and carbon filtration
    e. Deionizer
    f. RO system
    g. Ultrafiltration and UV Irradiation
    h. Portable RO
    i. Heat disinfection of water lines
3. Dialyzer Reprocessing Equipment
    a. Types of Automated dialyzer reprocessing machine
    b. Automated reuse equipment – components and function
    c. Automated reuse equipment – care and maintenance
4. Equipment's used for special procedures.
    a. Types of CRRT equipment
    b. CRRT equipment – components and function
    c. CRRT equipment – care and maintenance
5. PD cyclers
6. Defibrillators
7. Cardiac Monitors
8. MARS, SPAD and Prometheus System for Liver dialysis
9. ECMO
10. Plasmapheresis Equipment's
11. Bioimpedance analysis machine/ Body Composition Monitors
12. Online Hemodiafiltration
13. Blood Temperature, Blood Volume monitor
14. Enuresis monitor
15. Ultrasound machine- For Depth, Flow of AVF

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Basic Principles of Nursing Care (45 Hours)

1. Bed making
2. Vital Signs Monitoring
3. Input and Output chart
4. Maintenance of emergency crash cart
5. Bladder catheterization
6. Injections – intravenous, intramuscular, subcutaneous
7. Insertion of intravenous canulae
8. Cleaning and dressing of wounds and vascular access sites and peritoneal catheter exit site
9. Assisting the physician in procedures like minor surgery, vascular access, etc
10. Suturing & Removal of sutures
11. Care of bed ridden patients,
12. Documentation
13. Collection of blood, urine and stool specimens and their transfer aseptic precautions to the laboratory

Medical Law and Ethics (30 Hours)

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice" Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. 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.
9. Professional Indemnity insurance policy

10. Development of standardized protocol to avoid near miss or sentinel events.
11. Obtaining an informed consent.

Instrumentation Specific to dialysis therapy Practical's (60 Hours)

1. Equipment's used in Hemodialysis Parts
   a. HD machine
   b. Blood Circuit
   c. Cleaning and disinfection of HD machine
   d. OCM
   e. Trouble shooting of HD.
2. Water treatment System Parts
   a. Sand Filters
   b. Softener and carbon filtration
   c. Deionizer
   d. RO system
   e. Ultrafiltration and UV Irradiation
   f. Portable RO
   g. Heat disinfection of water lines
3. Dialyzer Reprocessing Equipment parts
4. Automated reuse equipment – care and maintenance
5. Equipment's used for special procedures.
   a. Types of CRRT equipment parts
6. PD cyclers parts and usage
7. Defibrillators parts and usage
8. Cardiac Monitors
9. MARS, SAPD and Prometheus System Parts
10. ECMO Machine parts
11. Plasmapheresis centrifugal machine parts
12. Bioimpedance analysis machine / Body Composition Monitors parts and working mechanism.
13. Online Hemodiafiltration machine parts
14. Blood Temperature, Blood Volume monitor
15. Enuresis monitor
16. Ultrasound machine- For Depth, Flow of AVF

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Clinical Postings II (CT) (180 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills.

Areas to be covered.

1. OPD
2. Dialysis Unit
3. Procedure room for assisting in renal biopsy & central venous catheterization/ PD catheterization.

Fourth Semester

Pharmacology related to dialysis therapy. (60 Hours)

1. IV-fluid therapy with special emphasis in renal diseases
    a. Basics of fluid therapy
    b. Calculation of fluid infusion
    c. Intra-venous fluid administration
    d. Commonly used iv fluids
2. Diuretics
    a. Diuretics and its classification, actions, dosage, side effects & contraindications
3. Anti-hypertensives
    a. Classification of anti-hypertensive drugs, its actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, drugs used in hypotension.
4. Drugs and dialysis
    a. Importance of dialyzabilty of drugs
    b. Factors affecting the dialyzability of drugs
    c. Drugs that need modifications
    d. Physicochemical characteristics of the drug and dialyzability
    e. Dialysis properties that affect drug clearance.
    f. Dialyzability of phenobarbital
    g. Dialyzability of lithium
    h. Dialyzability of methanol
5. Vitamin-D & its analogues, phosphate binders, iron, folic acid & other vitamins of therapeutic value
    a. Metabolism of Vitamin D in health & disease.
    b. Mechanism of action, Therapeutic use and contraindication of
        i. Vitamin D & its analogues.
        ii. phosphate binders & Newer Phosphate Binders.
        iii. Calcimimetics Agents
        iv. vitamin B12and folic acid.

6. Erythropoiesis Stimulating Agent (ESA)
    a. Use of ESAs
    b. Different types of ESAs
    c. Mechanism of action of ESAs
    d. Pharmacokinetics of ESAs
    e. Therapeutic use of ESAs
    f. Adverse effect of ESAs.
    g. Precautions and contraindications of ESAs.
7. Heparin and low molecular weight heparin (LMWH)
    a. Mechanism of action of unfractionated heparin (UFH).
    b. Mechanism of action of LMWH.
    c. Contraindication of unfractionated heparin and LMWH.
    d. Adverse effect of heparin and LMWH.
    e. Monitoring of heparin therapy.
    f. Heparin induced thrombocytopenia.
8. Protamine sulphate
    a. Therapeutic use of Protamine Sulphate.
    b. Dosage and administration
    c. Adverse reaction.
9. Newer anticoagulants
    a. Pharmacology of heparinoids.
    b. Pharmacology of regional citrate anticoagulant
    c. Pharmacology of thrombin inhibitors
10. Chemicals Used in Dialysis Unit (Renalin- Peroxyacetic Acid, Formalin, Citrate, Sodium hypochlorite and hydrogen peroxide)
    a. Therapeutic use, precautions, and adverse effects of formalin
    b. Therapeutic use, precautions, and adverse effects of citrate
    c. Therapeutic use, precautions, and adverse effects of sodium hypochlorite
    d. Therapeutic use, precautions, and adverse effects of hydrogen peroxide
    e. Therapeutic use, precautions, and adverse effects of Peroxyacetic Acid
11. Hemodialysis concentrates
    a. Composition of hemodialysis concentrates.
    b. Types of hemodialysis concentrates and write it's advantages and disadvantages
    c. Clinical implication of altered dialysate composition
12. Peritoneal dialysis (PD) fluid
    a. Buffer and pH of PD fluid.
    b. Electrolyte concentrations of PD fluid
    c. Newer PD Solutions
13. Potassium exchange resin
    a. Clinical pharmacology, mechanism of action and therapeutic use of potassium exchange resin.
    b. Contraindications of potassium exchange resin
    c. Adverse reactions of potassium exchange resins
    d. Drug interactions of potassium exchange resin

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14. Immuno Suppressive Drugs
15. CRRT Replacement & Dialysis Solutions
16. Online HDF
17. Emergency Drugs used in Dialysis
18. IV iron preparations.
19. Organ Preservation Solutions
20. Other Newer Drugs for Dialysis & Transplantation.

Psychology (45 Hours)

1. Introduction to Psychology
    a. Definition of Psychology, Branches, Fields and Scope of Psychology, Educational and School Psychology' Physiological, Developmental, Social, Industrial and Organizational and Clinical Psychology. Emerging specialties, Environmental, Forensic and Health Psychology.
2. Scientific methods of studying Psychology
    a. Experimental, Observational, Case Study/Clinical Methods, Interview, Survey, Introspective and Testing Methods – Merits and Demerits.
3. Major schools of Psychology
    a. Structuralism-Functionalism-Behaviorism-Gestalt Psychology-Humanistic Psychology
4. Physiological basis of Psychology
    a. The Nervous System: Division of the nervous system, Neurons, Transmission of neural signals. The Synapse; The Implication of Chemical Transmission, Reflex Arcs and The Spinal Cord, The Endocrine System, The Brain, The Cerebral Hemispheres, The Central Core, Disorders of the Brain, Studying Brain behavior relations
5. Normal development
    a. Definition, Psychological needs and Development during Infancy, Early Childhood, Late Childhood, Adolescence, Adulthood and Old Age. Brief description of the relative importance of heredity and environment
6. Attention and Perception
    a. Definition, Types of attention, Voluntary, Involuntary and Habitual. Determinants of attention. Principles of perception, Inaccurate perception and Underlying reasons. Brain mechanisms of visual perception, Effects of brain damage on visual perception, Perception of form, Perception of Space and Motion.
7. Personality
    a. Definition- Trait and Type Theories of Personality, The social learning approaches: Bandura, Psychodynamic approach: Freud, The humanistic approach: Maslow and Self- actualization. Rogers and Conditions of worth, Assessment of Personality through questionnaires and Projective tests.

8. Learning and Memory
    a. Definition, Factors affecting learning, Laws of learning by Thorndike; Importance of studying Psychology of learning in relation to Allied Health Sciences. Experimentation in learning: Human and Animal learning, Quantitative assessment of learning; Learning curves; Theories of conditioning, Pavlov's contribution. The biological significance of classical conditioning-Basic principles of classical conditioning-Conditioned emotional responses, what is learned in classical conditioning?
    b. Operant conditioning; The laws of effect of Skinner and operant behavior, The three contingencies, Reinforcement, Punishment and Extraction, Other Operant procedures and Phenomena. Conditioning of complex behavior, Aversive control of behavior, Observation and imitation.
    c. Sensory memory, short term or Working memory, Long term memory learning and encoding in long term memory, Organization of long-term memory, Reasons for forgetting.
9. Intelligence
    a. Definition, meaning of intelligence, Theories of intelligence, Spearman's two factor theory, an information processing theory of intelligence, The neuro psychological theory of intelligence, Mental age, and I.Q, Normal distribution of intelligence levels, Intelligence Testing, Intelligence tests, Uses and abuses of intelligence tests.
10. Motives and Emotions
    a. Definition, Motives, Drives, Needs, Biological needs, Eating, Sexual behavior, Aggressive behavior. The nature of Emotions, Expression and recognition of Emotions, Feelings and Emotions, Physiological basis of Emotions, Emotion and health, Heart disease, Headache, Asthma, Rheumatoid arthritis, Cancer and Peptic Ulcer. Theories of Emotions, James Lange theory, Cannon Bard theory and other theories
11. Attitudes and their Formation
    a. Sources of attitude, Nature of attitudes. Measurement of attitudes. Change of attitudes, Persuasion, Prejudices. Social influences and Group behavior, Imitation, social facilitation, social loafing, Reciprocity, Commitment, Attractive people, Authority, Group decision making, resisting social influence, Interpersonal relation and loving.
12. Lifestyle, Health, Stress and Coping Behavior
    a. Cultural evolution, Life style choices and consequences, Healthy and Unhealthy life styles. Nutrition, Physical fitness, Smoking and Drinking. Stress and Health, the biological basis of stress, Stress and Physical functioning, Coping with stress, Adjustment a life-long process. Cognitive appraisal and Stress, Stressful life styles, coping with everyday stress, Sources of stress, Coping styles and Strategies, Stress inoculation training
13. Communication
    a. Persuasion, Communication, the source, the message, the audience, Behavior in groups, the nature of groups, Leadership, Group structure, Group thinking, Herold Leavitt's communication network.

14. Clinical Psychology
    a. Definition of Clinical Psychology, Role of Clinical Psychology in Allied Health Sciences, Concept of Normality and Abnormality. The nature and causes of mental disorders. Classification of abnormal behavior DSMIV, ICD 10, Difference between Neuroses and Psychosis. Anxiety, Somatoform and Dissociative disorders, Personality disorders, Psychoactive substance use disorders, Schizophrenic disorders, Mood disorders
15. Psychological Assessment and Treatment
    a. Tests of intelligence (important test), Tests of personality (important test), Tests for adjustments and conflicts (Bells adjustment inventory, Sentence Completion Test, Projective tests such as Rorschach, TAT, CAT, CPT etc.) The treatment of mental disorders, Insight therapies, Psychoanalysis and Psychodynamic approaches, Humanistic therapy, Gestalt therapy, Behavior and Cognitive Behavior therapies, Counselling. Group therapy, Electro convulsive therapy, Psychosurgery, Ethical and legal issues in Psychotherapy.

RENAL NUTRITION (45 Hours)

1. Basics of Nutrition
2. Nutritional Screening and Assessment
    - Introduction
    - Mini Nutritional Assessment
    - Nutritional Assessment
        i. Medical History
        ii. The effect of comorbidities
        iii. Medications and Drug-Nutrient Interactions
        iv. Psychosocial History
        v. Dietary History
        vi. Physical Examination
        vii. Anthropometric Measurements
        viii. Biochemical Assessment and Laboratory Data
    - Nutritional Assessment Tools
        i. Subjective Global Assessment (SGA)
        ii. Dialysis Malnutrition Score (DMS)
        iii. Malnutrition and Inflammation Score (MIS)
3. Impact of kidney disease on amino acid, protein, carbohydrate and lipid metabolism
    - Metabolic alterations in kidney disease
    - Impact of kidney disease on acid base balance,
    - Impact of kidney disease on protein and amino acid metabolism,
    - Impact of kidney disease on carbohydrate metabolism and
    - Impact of kidney disease on lipid metabolism

4. Nutritional management in CKD patient (pre-dialysis) fluid and electrolytes
    - Determine of Nutritional care in CKD patient,
    - Nutritional care indications
    - Nutrient guidance for adult patient with pre-ESRD
    - Management of fluid in patient with pre-ESKD and electrolytes management in patient with pre-ESRD.
5. Nutritional management of HD patient
    - Purpose of nutritional management in HD patient
    - Factors favoring nutritional status
    - Nutrient guidance in HD patient
    - Intentions of nutrition care in HD patient
    - Diet in HD patient
6. Nutritional management of Peritoneal Dialysis (PD) patient
    - Nutrient guidance in PD patient
    - Intentions of nutrition care in PD patient
    - Diet in PD patient
7. Nutritional management of renal transplant recipient
    - Motives of medical nutrition therapy for renal transplant recipient,
    - Factors favoring nutritional status,
    - Nutrient favoring for kidney transplant recipient
    - Determine nutrition care for kidney transplant recipient and diet for kidney transplant recipient
8. Nutritional management of acute kidney injury (AKI)
    - Determination of medical nutrition therapy for patient with AKI
    - Factors favoring nutritional status,
    - Nutrient recommendation for patient with AKI
    - Determination of nutrition care in patient with AKI and nutritional support for patient with AKI
9. Calcium, phosphate, parathyroid hormone & vitamin-D in CKD patients
    - Chronic kidney disease and mineral bone disease (CKD MBD),
    - Influence of kidney disease on Ca,
    - Phosphate, PTH and Vitamin- and nutritional modification in CKD MBD.
10. Goals of nutritional management in HD patient,
11. factors influencing nutritional status in HD & PD
12. Purpose of nutrition care in HD & PD.

Dialysis Therapies – Part I (75 Hours)

1. Hemodialysis equipment
   Hemodialysis apparatus, function of dialysis machine, parts of extracorporeal circuit of dialysis machine, parts of dialysis delivery system
2. Initiation of dialysis therapy
   Initiating of dialysis therapy, choice of modality, options of renal replacement therapy, when to initiate dialysis, relationship between uremic syndrome and eGFR, indications of dialysis in the chronic setting and concept of early initiation of dialysis

3. Types of dialyzers and its membrane
   Structure of dialyzer, types of dialyzers, hollow fiber dialyzer, Parts of hollow fiber dialyzer, types of dialyzer membranes, cellulosic membrane, Synthetic membranes and its advantages, dialyzer performance and clearance, biocompatibility of the dialyzer, advantages of biocompatible membrane
4. Composition of dialysis solution
   Preparation of dialysate, types of concentrate, mixing of dialysate, chemical used to prepare dialysate, monitoring of dialysate parameter for quality maintenance, consequences of altered dialysate composition
5. Vascular access and its types and complication
   Types of vascular access for hemodialysis, permanent and temporary catheter, location of temporary catheter, pre-dialysis assessments for all types of vascular access, sign of exit site infection of catheter, importance of catheter care including hand hygiene and dressing, method of catheter lock, indication and contraindications of AVF, locations and construction of AVF, preparation of AVF evaluation, advantages, disadvantages and complications of AVF, AVG and its indications, characteristics of graft materials, types of synthetic materials, Types of AVG and its locations, Hero graft, advantages and disadvantages of AVG, use of Doppler for creating AVF & AVG, Use of USG for temporary access creation, Basic Uses of Doppler & USG.
6. Cannulation of vascular access in HD
   Importance of cannulation, steps in cannulation, skin preparation, Rule of 6's, cannulation and its techniques- ladder rope, buttonhole and same area, needle removal and hemostasis, post dialysis assessment and cannulation of new fistula
7. Vascular access surveillance
   Arm Elevation Test, Allen's Test, Inflow & Out flow stenosis & define vascular access recirculation, classify vascular access recirculation, causes, symptoms and indication of recirculation, Measurement of access recirculation, protocol for urea-based measurement recirculation, Alternative means of measuring access recirculation.
8. Types of hemodialysis modalities
   Categorize types of HD, Incenter hemodialysis and its advantages and its disadvantages, home hemodialysis – its indications, contraindications, Requirements, Ideal characteristics, Machines, types advantages and its disadvantages.
9. Dialyzer reprocessing
   Need for Dialyzer reprocessing, techniques, Steps in dialyzer reprocessing, advantages and disadvantages of dialyzer reprocessing, automated dialyzer reprocessor, advantages of dialyzer reprocessing machine, safe practice in reuse, factors affecting reusability of dialyzer, strategies to maximize reuse, preparation dialyzer for reuse, quality assurance and dialyzer reprocessing and water requirements.
10. Anti-coagulation
    principle coagulation pathways, blood clotting in the extracorporeal circuit, heparin, clotting tests used to monitor heparin therapy, routine heparin dosage prescription, heparin rebound phenomenon, regional heparinization, tight heparinization, heparin free dialysis- its indication, bicarbonate dialysis solution with low-concentration citrate and other anticoagulation techniques.

11. Hemodialysis adequacy
    Definition, explain urea kinetic modelling (UKM), urea as a marker for uremic toxins, urea reduction ratio (URR), advantages and disadvantages of URR, single pool kt/v, double pool UKM and eq kt/v.
12. Water treatment unit (WTU)
    Purpose of water treatment for dialysis, various sources of water, types of contaminants in water, various contaminants in water and its effect, components of a dialysis center's WTU, pre-treatment components, primary treatment components, distribution system, monitoring and testing of dialysis water treatment system, microbial testing and chemical monitoring
13. Medications used in dialysis patients.
    List the drugs used in dialysis patients, indication of these drugs- heparin, Volume expanders like saline, albumin, Sodium bicarbonate, Glucose, Xylocaine, Antibiotics, Inj. Erythropoietin, iron, Vitamins, Anticonvulsants, Deferoxamine, Phosphate binders, Anti-hypertensives and emergency drugs.
14. Infection control and universal precaution
    Prevention of infection in dialysis unit, infection control practices in dialysis unit, Universal precaution, current recommendation for immunization in patients with chronic kidney disease, methods that decrease the risk of infection in the vascular access, spread of hepatitis B, hepatitis C, hepatitis D and HIV in dialysis unit, specific infection control requirement for a patient with hepatitis B, why person with CKD are predisposed to development of active tuberculosis after exposure to the bacterium, dialyzer reprocessing contributing to bacteremia, reasons why patients with HIV do not require special isolation or infection control procedures.

Medical Electronics for health sciences (45 Hours)

1. Introduction to semiconductor devices
   Principles of semiconductor diodes, Zener diode, BJT, FET, SCR & UJT and applications of diodes
2. Amplifiers
   Basic amplifier configuration, types of amplifiers – Voltage amplifiers, current amplifiers, power amplifiers, frequency response, low noise pre amplifiers.
3. Feedback Amplifiers and Oscillators
   Principles of feedback amplifiers, condition for sustained oscillation, RC and LC oscillators
4. Introduction to ICs
   Linear and digital ICs, applications of op amp like amplifiers, waveform generators, timer, A/D and D/A converters, active filters
5. Transducers and display devices
   Various types of transducers – electric, capacitive, inductive, photo electric and piezoelectric. Types of recorders – ink jet, heated styles, photographic, low frequency magnetic tape recorder. Different types of oscilloscopes – long persistence, storage, digital scopes.

6. Introduction to diagnostic equipment
   Bio potential recording devices, ECG, EEG, EMG, non-electrical parameter measurements, biochemical and microbiologic equipment.
7. Introduction to imaging techniques
   Principles of radiography, ultrasonography, and radioisotopes

Research methodology and biostatistics (60 Hours)

1. Introduction to the Process of Conducting Research
   Introduction, Steps in the Process of Research, identifying a hypothesis and/or research problem, specifying a purpose, Research Designs, creating research questions, Review of literature, Ethics of research and informed consent, Research proposal writing & components of Research paper.
2. Introduction to Qualitative, Quantitative and Mixed methods Research
   Essence of Qualitative Data, Sampling, Collection Techniques, Biography, Essence of Quantitative Data, Collection and Analysis Techniques, Choosing a good instrument, Interval and Ratio Scales, Validity and Reliability, Essence of Mixed Methods, Advantages, Design Components, Explanatory Mixed Methods Frameworks
3. Epidemiological Methods
   Measuring disease frequency, Descriptive and analytical studies-observational and experimental studies and Biases in Epidemiological Studies
4. Introduction to Probability, distributions and sampling
   Probability, addition and multiplicative theorems, problems, Probability Distribution-Binomial, Poisson, Normal, Applications to health sciences, Sampling methods, uses of sampling, Sample size
5. Introduction to Descriptive Statistics
   Introduction, Summarizing and describing a collection of data, Univariate and bivariate analysis, Mean, mode and standard deviation, Percentages and Ratios, Histograms, identifying randomness and uncertainty in data, summarizing biological data, Identifying the dependent and independent variables, Confidence levels
6. Introduction to Inferential Statistics
   Drawing inference from data, Estimation, testing of hypothesis, Type I & type II errors, power and p-value, modelling assumptions, Identifying Patterns, Regression analysis, t-test, Analysis of Variance, Correlations, Chi-square, Non-parametric tests

PHARMACOLOGY RELATED TO DIALYSIS THERAPY Practical's (60 Hours)

1. Administration of Erythropoiesis stimulating agents (ESA)
2. IV Iron Preparation
3. Vitamin supplements
4. Crystalloids & Colloids
5. Inotropic drugs
6. Anti-pyretic drugs
7. Anti-emetic drugs
8. Heparin, LMWH and Tri-sodium citrate, Regional Anticoagulation
9. Chemicals used in dialysis unit
10. PD fluids

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11. Dialysis & CRRT solutions
12. Emergency Drugs used in Dialysis

DIALYSIS THERAPY PART- 1 Practical's (60 Hours)

HD Equipment

1. Motor brush
2. Loading valve
3. Shunt cover
4. Hansen connector
5. Blood pump motor
6. Diasafe or Cut-off filter
7. Degas filter

Calculating Hemodialysis Adequacy
Assessing HD Vascular Access
Cannulating HD Vascular Access
Water Treatment Plant Maintenance

1.Daily
2.Weekly

Infection Control in dialysis unit

Clinical Postings III (CT) (180 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills.

Students will continue with their clinical procedures along with careful analyzing and performing AVF and AVG cannulation and decannulation procedure, monitoring of water quality with the assistance of senior dialysis technologist.

Areas to be covered.

1. OPD
2. Dialysis Unit
3. Procedure room for assisting in biopsy & catheterization.

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Fifth Semester

Dialysis Therapies – Part II (60 Hours)

1. Hemodialysis procedure
   a. Patient assessment, management and prevention– General, pre, intra and post dialysis
   b. Lab data analysis
   c. Machine monitoring during hemodialysis
2. Hemodialysis prescription
   a. Acute hemodialysis prescription
   b. Chronic hemodialysis prescription
3. Acute complication
   1. Classify intra-dialytic complications- frequent and less commonly occurring
   2. Sign, symptoms, prevention and management of
      a. Hypotension,
      b. Muscle cramps,
      c. Nausea and vomiting,
      d. Chest pain and back pain,
      e. Fever and chills,
      f. Itching,
      g. Headache,
      h. Dialysis disequilibrium syndrome (DDS)
      i. Dialyzer membrane reaction- type a and b,
      j. Hemolysis,
      k. Air embolism,
      l. First use syndrome,
      m. Arrhythmias,
      n. Cardiac arrest,
      o. Cardiac tamponade,
      p. Hypertension,
      q. Exsanguinations,
      r. Seizures,
      s. Anaphylaxis.
4. Lab-data analysis
   a. Various laboratory test use assess kidney disease- urea, creatinine, GFR measurement, sodium, potassium, chloride, bicarbonate, serum uric acid, hemoglobin, phosphate, calcium, PTH, vitamin D level, albumin, cholesterol, blood glucose level-fasting, post-prandial and random, total protein, liver function tests, serum bilirubin, ALT, AST and urine analysis.
   b. Importance laboratory investigation of kidney disease
5. Introduction to peritoneal dialysis
   a. History of peritoneal dialysis
   b. Physiology of PD – Kinetics of PD,
   c. Three-pore model & Distributive Model

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d. Acute peritoneal dialysis
e. Indications- Strong indications, PD preferences, non-renal indications
f. Contraindications for chronic PD- relative contraindications to peritoneal dialysis and Peritoneal dialysis is not preferred but is possible in select circumstances.

6. Peritoneal dialysis apparatus
   a. Solution
   b. Transfer set,
   c. Connectologies.
   d. Access for PD
   e. Catheter and Exit site care
7. Peritoneal dialysis process & Therapies
   a. Assessment of peritoneal membrane permeability
   b. Adequacy of peritoneal dialysis
   c. PD therapies – intermittent & continuous
8. Peritoneal dialysis complications & management
   a. Non - infectious complications of PD
   b. Mechanical and metabolic complications
   c. Infectious complications of PD,
   d. Patient Education and Training
   e. Nutrition in PD
   f. Long term complications in PD
9. Pediatric dialysis
   a. Renal replacement therapy on children
   b. Complications of peritoneal dialysis in children
   c. Equipment required for pediatric chronic peritoneal dialysis.
   d. HD prescription in children
   e. Various vascular access for HD in children
   f. Dialysis machine and blood lines
   g. Extracorporeal blood access and circulation
   h. Immunization in children undergoing dialysis.
10. Pregnancy in dialysis patients
    a. Contraception
    b. Diagnosis of pregnancy in dialysis patients
    c. Hypertension in pregnant patients
    d. Drug removal
    e. Anemia
    f. Peritonitis occurrence
    g. Dialysis modalities- HD and PD
    h. Diet

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Renal transplantation and coordination (60 Hours)

1. Introduction & Renal Transplantation
    a. Types of organ donors (Living and deceased donors)
    b. Types of deceased organ donors – Deceased heart beating donors and non-heart-beating donors
    c. Types of transplantation
    d. Indications and contraindications for transplantation
    e. Types of kidney transplantation
    f. Importance of immunosuppressive drugs in kidney transplantation
2. Brain stem death
    a. Define brain stem death
    b. List the tests to confirm brain stem death and their importance
    c. Explain the brain stem death importance in organ transplantation
    d. Explain the Human Organ Transplantation Act and ethical issues related to transplantation
3. Basics of immunology
    a. Define immunity, immunology, antibody, antigen and complement system
    b. Types of immunity (Innate & Acquired immunity)
    c. Explain the organs and cells involved in the immune system and their functions
    d. List the functions of the immune system
4. Immunology related to kidney transplantation.
    a. Define sensitivity and autoimmunity
    b. Causes for sensitization
    c. Immunological tests recommended during kidney transplantation
    d. Significance of blood groups in renal transplantation
    e. Define HLA, its location
    f. Types and significance of HLA
    g. Explain the HLA inheritance and its importance in renal transplantation
    h. Define cross-match test and panel reactive antibodies & list the importance of these tests
    i. Explain CDC, ELISA and flow cytometry tests
5. Renal Transplantation Procedure
    a. Explain the pre-renal transplant donor (Living and deceased) and recipient evaluation.
    b. Pre-transplant counselling of donor and recipient and importance of consent for organ donation
    c. Steps of preoperative preparation of the kidney donor and the recipient
    d. Types of nephrectomy methods (incision) and their importance
    e. List the organs/tissues/parts procured from the donor during nephrectomy
    f. Define warm and cold ischemia time.
    g. List the steps of kidney preservation.
    h. List the steps of kidney implantation.
    i. Explain the relative and absolute contraindications of living and deceased donor renal transplantation.

j. Post-operative care of donor.
k. Post-operative care of recipient –immediately after the transplant and long term follow up

6. Post renal transplantation.
   a. History of immunosuppressive drugs
   b. Define immunosuppressive drugs and list the importance of these drugs in renal transplantation
   c. Types of immunosuppressive drugs used for kidney transplantation Define induction therapy and list the drug names
   d. Define maintenance therapy and list the drug names
   e. Define triple therapy and list the drugs used under this therapy
   f. Complications/side effects of cyclosporine, tacrolimus, Azathioprine, MMF, Prednisolone, Sirolimus and ATG
   g. Explain the post-transplant complications (early and late) – Surgical, graft dysfunction and drug related complications
   h. Define the types of graft rejection and list the risk factors, features, and management
   i. Ethical and social issues related to dialysis and renal transplantation
7. Introduction to transplant coordination
   a. Define the term transplant coordinator
   b. Eligibility criteria for transplant coordinator
   c. Importance of transplant coordination team and their responsibilities
   d. Explain the role of kidney transplantation coordinator and coordination team
   e. Understand the work process of a transplant coordinator (routine)
   f. Explain the importance of consent for the organ donation
8. Living Donor kidney donation process
   a. Process of coordinating and monitoring living donor kidney transplantation
   b. Importance of document preparation for kidney transplantation
   c. Apply the acquired knowledge of transplantation for giving awareness about kidney disease and transplantation (Patient education)
9. Deceased donor kidney donation process
   a. Explain the process of identification of donor, declaration of brain stem death and evaluation of donor
   b. Explain the process of coordinating and monitoring the deceased donor kidney transplantation (Approaching the family members of donor, Coordination with regional committees, Allocation, Matching, organ procurement, storage, and transportation)
   c. Explain the process of creating a kidney transplantation registry
   d. Apply the acquired knowledge of transplantation giving awareness about deceased donor transplantation and becoming a deceased donor in the society
10. Introduction to grief counselling
    a. Define grief counselling and bereavement.
    b. Explain the grieving or bereavement process (Kubler Ross Model, Individual's mental status during grief)

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11. Grief counselling and organ transplantation
    a. Explain how grief counselling is applied to end stage organ failure
    b. Explain the role of transplant coordinator during grief counselling
12. The functioning of transplant registration centers
13. Explain the functions of national, state or regional transplant registry services & registration centers
14. Human Organ Transplant Act and its amendments

CLINICAL PROBLEMS IN DIALYSIS & EVIDENCE BASED PRACTICE IN DIALYSIS THERAPY (60 Hours)

1. Anemia and ESA use
    a. Anemia in dialysis patient.
    b. Causes of anemia in CKD patient.
    c. Clinical features
    d. Diagnostic test
    e. Treatment.
2. Hypertension in dialysis patients
    a. Definition and measurement of hypertension.
    b. Pathophysiology of hypertension.
    c. Management of hypertension in dialysis patient.
    d. Various types of antihypertensive drugs used in end-stage kidney disease.
    e. Mechanism of intra-dialytic hypertension
3. Cardiovascular abnormalities
    a. Epidemiology of CVD in chronic kidney disease
    b. Risk factors for cardiovascular disease in dialysis patients.
    c. Left ventricular hypertrophy.
    d. Uremic pericarditis.
    e. Risks of dialysis therapy in patients with pericarditis
4. Psychological aspect in dialysis patients
    a. Common psychologic problem in ESRD patients
    b. Depression
    c. Dementia
    d. Anxiety and behavioral disorders
    e. Other psychologic problems- marital issues, sexual dysfunction, socioeconomic issues, rehabilitation, quality of life (QOL)
5. Blood borne disease in dialysis patients
    a. Major blood borne infection in dialysis patient
    b. Hepatitis B infection in dialysis patient
    c. Interpretation of diagnostic test in hepatitis b infection
    d. Epidemiology of hepatitis B virus in dialysis units
    e. Hepatitis B vaccination
    f. Hepatitis C infection in dialysis patient
    g. Interpretation of diagnostic test in hepatitis c infection
    h. Epidemiology of hepatitis C virus in dialysis units
    i. Human immunodeficiency virus (HIV) infection in dialysis patient

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j. Clinical manifestations of HIV
k. Management of HIV infection
l. Dialysis in patients who are HIV positive
m. Prevention of blood borne infection in dialysis patients

6. Endocrine disturbances
   a. CKD and endocrine abnormalities.
   b. Effects of Thyroid Dysfunction on the Kidney
   c. Various hormones like insulin, glucagon, renin–angiotensin, aldosterone, norepinephrine and epinephrine, cortisol, thyroid function, testicular function, growth hormone, parathyroid hormone (PTH), sexual dysfunction in men and women, and its effect on dialysis patient.
7. Bone disease
   a. Renal Bone disease.
   b. Chronic Kidney Disease –Mineral and Bone Disorder.
   c. Role of PTH, Vitamin D, and Fibroblast Growth Factor-23.
   d. Development of secondary hyperparathyroidism in CKD
   e. Classification bone diseases in CKD patients
   f. Medical treatments of CKD-MBD.
   g. Role of optimal dialysis prescription in CKD – MBD.
8. Neurologic aspects of uremia
   a. Neurological problems in dialysis patients.
   b. Uremic encephalopathy.
   c. Acute aluminum intoxication.
   d. Acute cerebral dysfunction during or immediately after dialysis.
   e. Stroke in dialysis patient.
   f. Physical disability in dialysis patient.
   g. Peripheral neuropathy
   h. Carpel tunnel syndrome
   i. Autonomic neuropathy and myopathy
   j. Sleep disorders in dialysis patients.
9. APKD
   a. Introduction
   b. Pathologic features
   c. Clinical manifestations
   d. Diagnosis and differential diagnosis
   e. Management
   f. Outcome
10. Dialysis amyloidosis
   a. Define amyloidosis.
   b. Risk factors for dialysis related amyloidosis.
   c. Pathophysiology of amyloidosis.
   d. Clinical and laboratory manifestations of amyloidosis.
   e. Symptoms of amyloidosis.
   f. Treatment of amyloidosis

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11. Geriatric Dialysis
    a. RRT in geriatric patient.
    b. Features of ageing in CKD patients.
    c. Choice of modality for geriatric patients' dialysis.
    d. Lifestyle benefits from the patient perspective
    e. QOL for geriatric patients on dialysis
    f. Falls and factors associated with falls in dialysis patients.
    g. Dialysis related risk factors in geriatric patients.
12. Malnutrition
    a. Epidemiology
    b. Pathogenesis
    c. Nutritional assessment
    d. Supplementation
13. Skin Disorders
    a. Dermatologic manifestations of disease
        a. related with ESRD
        b. related with uremia
    b. related with renal transplant
    c. Management
    d. Treatment
14. GI Disorders
    a. GI symptoms in kidney disease
    b. Gastritis, duodenitis, upper gastrointestinal hemorrhage
    c. Diseases of the colon
    d. Gastroparesis
    e. Management and treatment

Advanced extracorporeal therapies (60 Hours)

1. Hi-flux and Hi-efficiency
    a. Hi-flux dialysis and its characteristics
    b. Hi-efficiency dialysis and its characteristics
2. Slow continuous therapies
    a. Multidisciplinary team
    b. indications of CRRT
    c. vascular access used and extracorporeal circuit
    d. types of CRRT- SCUF, C-HD, C-HF, C-HDF
    e. contraindications of CRRT
    f. complications of CRRT
3. SLED
    a. Describe slow low efficiency dialysis (SLED).
    b. indication and contraindication of SLED.
    c. advantages and disadvantages of SLED.
    d. equipment used for SLED.
    e. prescription of SLED

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4. Plasmapheresis
    a. Indication and contraindication.
    b. Pharmacokinetics of immunoglobulin removal
    c. Pharmacokinetic basis for TPE prescriptions.
    d. How to estimate plasma volume.
    e. Various replacement solutions used in Plasmapheresis.
    f. Various complication of Plasmapheresis.
    g. Double filtration plasmapheresis
5. Hemoperfusion
    a. Indications of hemoperfusion
    b. Choice of therapy for the treatment of poisoning
    c. Technical requirements for hemoperfusion
    d. Complications occurs during hemoperfusion
6. Principle of ICU care
    a. Ventilator – Mode and operation
    b. Dialysis in ICU
    c. Basics of ICU management
    d. Basics of ECG
7. Common uro-surgical procedures
    a. Common urosurgical procedures
    b. Instruments & their management
    c. ESWL
8. Liver Dialysis/ Extracorporeal Albumin Dialysis
    a. Indications and contraindications
    b. Toxins cleared in Liver Dialysis
    c. Liver Dialysis system & Types
    d. Principles
    e. Process
    f. Types of treatment
    g. Complications and Management
9. ECMO
    a. Indication & Contraindications
    b. Principles
    c. Risk of ECMO
    d. Preparation and expecration of ECMO
    e. ECMO & Dialysis
10. Hemodiafiltration
    a. Introduction
    b. Preparation replacement fluid
    c. Techniques of HDF
    d. Technical aspects
    e. Advantages and disadvantages

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11.Sorbent Dialysis
   a. Introduction
   b. Requirements
   c. Sorbent cartridge and its function
   d. Parameters of sorbent system
   e. Serum electrolytes and acid base adjustments
   f. Uses
   g. Conclusion

12.Adsorption techniques
   a. Introduction
   b. Basic principles
   c. Extracorporeal techniques using adsorption
   d. Extracorporeal filtration in adsorption systems
   e. Clinical experiences with high filtrate reinfusion (HFR)

Renal transplantation and coordination Practical's (60 Hours)

1. Renal transplants work up.
2. Grief Counseling
3. Transplant Counseling

Advanced extracorporeal therapies Practical (60 Hours)

1. Conducting dialysis for-
   a. Patient with congestive heart failure (CHF)
   b. Advanced liver disease
   c. Patient positive for HCV, HIV & HBsAg
   d. Acute rejection and failed transplant
   e. Poisoning patient
   f. Pregnancy
   g. Dialysis in infants and children
   h. Application of ECMO

Dialysis Therapies – Part II Practical's (60 Hours)

1. Hemodialysis procedure
   Patient assessment, management and prevention– General, pre, intra and post dialysis
   Lab data analysis
   Machine monitoring during hemodialysis
2. Hemodialysis prescription
   Design Acute hemodialysis prescription
   Design Chronic hemodialysis prescription
3. Manage Acute complication
   Hypotension,
   Muscle cramps,
   Nausea and vomiting,
   Chest pain and back pain,
   Fever and chills,

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Itching,
Headache,
Dialysis disequilibrium syndrome (DDS)
Dialyzer membrane reaction- type a and b,
Hemolysis,
Air embolism,
First use syndrome,
Arrhythmias,
Cardiac arrest,
Cardiac tamponade,
Hypertension,
Exsanguinations,
Seizures,
Anaphylaxis.

4. Identify Peritoneal dialysis apparatus
   Solution
   Transfer set,
   Connectologies.
   Access for PD
5. Calculate Peritoneal dialysis adequacy & PET
6. Manage Peritoneal dialysis complications
   Non - infectious complications of PD
   Mechanical and metabolic complications
   Infectious complications of PD,
7. Educate and Train Patient for PD
8. Perform Pediatric dialysis
   Equipment required for pediatric chronic peritoneal dialysis.
   HD prescription in children
   Various vascular access for HD in children
   Dialysis machine and blood lines.
   Extracorporeal blood access and circulation
   Immunization in children undergoing dialysis.
9. Plan to perform dialysis in Pregnancy

Clinical Postings IV (180 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills.

Areas to be covered:

- Dialysis unit
- ICU
- Renal transplants work up.
- Operation Theater for Observing AVF/AVG Creation, PD catheter Insertion & Renal Transplantation.

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Sixth Semester

Recent Advancements in Renal replacement therapies (90 Hours)

i. Current research and recent advances in dialysis technology
   a. Newer dialysis technologies
   b. Wearable artificial kidney
   c. Bio artificial kidney
   d. New sorbent technologies
ii. Information technology and dialysis
   a. TDMS
   b. Patient Online
   c. Web based education,
   d. Short message service (SMS) texting
   e. Mobile apps
   f. Telemedicine in dialysis practice
   g. Other IT delivery methods
iii. Home Hemodialysis
   a. Indications and contraindications of home hemodialysis
   b. Technical aspect of dialysis- legal, water preparation (plumbing), electrical considerations including backup power supply, dialysis machine choice and other equipment, space considerations and siting of dialysis machine, hygiene and noise, safety, medical staff and technical support, disposal of waste, storage of medication
   c. Psychological aspect of home hemodialysis.
   d. Advantages and disadvantages of conventional home dialysis
   e. Impact on daily hemodialysis
iv. Nocturnal hemodialysis
   a. Brief note on nocturnal hemodialysis
   b. Advantages of longer, slower dialysis
   c. Nocturnal dialysis in a dialysis center
v. Artificial Intelligence in renal replacement therapies
vi. Other Recent Advances in Dialysis Therapy
vii. Application of nanotechnology, microfluidics, bioreactors with kidney cells, and miniaturized sorbent systems
viii. New Techniques of Pediatric Dialysis
   a. NIDUS
   b. Carpediem

Principals of management (45 Hours)

i. Introduction to Management
   a. Introduction
   b. Definition
   c. Steps
   d. Planning
   e. Organizing
   f. Staffing
   g. Directing
   h. Controlling

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ii. Introduction to Clinical service Types of Hospitals
   a. Organization and administration of various clinical services: Outpatient services- In-patient services, Emergency services, Operation theatres, Nursing services and ICU's.

iii. Hospital Support services
   a. Organization and Administration of various Support services
      - CSSD
      - Diet
      - Medical records

iv. Hospital Ancillary Services
   a. Organization and Administration of various Ancillary services:
      - Housekeeping – Linen and Laundry-
      - Engineering services – Transportation

v. Hospital Diagnostic and Therapeutic services
   a. Organization and Administration of various Diagnostic and Therapeutic services:
      - Radiology
      - Laboratory
      - Pharmacy
      - Blood bank

vi. Safety and Risk management
   a. Hospital waste management
   b. Nosocomial infection
   c. Disaster management
   d. Hospital security service
   e. Occupational safety in hospitals

Introduction to quality assurance in dialysis and patient safety (75 Hours)

1. Quality assurance in Hemodialysis
   a. Dialysis Adequacy
   b. Infection control in dialysis unit
   c. Universal Precaution
   d. RO water quality monitoring
   e. Hemodialysis unit management
   f. Quality indicators in Hemodialysis
   g. Hazardous materials use and safety in Hemodialysis
   h. Disaster management in Hemodialysis unit
   i. NABH Standards
   j. JCI standards
2. Hemodialysis Vascular Access Surveillance
   a. Clinical monitoring of vascular access
   b. Recirculation
   c. Flow based techniques
   d. Rule of Six in AV fistula
   e. Pressure based techniques
   f. Other surveillance techniques

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3. Quality Assurance in Peritoneal Dialysis
   a. Peritoneal dialysis quality management
   b. Kinetic Modeling in peritoneal dialysis
   c. Peritoneal Dialysis patient and catheter survival
   d. Quality improvement in peritoneal dialysis
   e. Quality indicators in peritoneal dialysis
4. Quality Assurance in Renal transplantation coordination
   a. Quality indicators in renal transplantation
   b. Graft and Patient survival in renal transplantation
   c. Assessment techniques for renal donors and recipients
5. Safety in dialysis
   a. IPSG
   b. Advanced disaster preparedness
   c. Preparations to perform an emergency dialysis
   d. Fire safety
   e. Safety access of needle
   f. Violence at dialysis unit
   g. Employee safety
   h. Electrical safety in dialysis unit
   i. Emergency evacuation.
   j. Infection control

Basic and advanced cardiac life support (30 Hours)

1. BLS & ACLS
2. The universal algorithm for adult ECC
3. Ventricular fibrillation/Pulseless ventricular tachycardia algorithm
4. Pulseless electrical activity (PEA) / asystole algorithm
5. Bradycardia treatment algorithm
6. Tachycardia Treatment algorithm
7. Hypotension / Shock
8. Acute myocardial infarction
9. Paediatric Advanced life support
10. Airway management
11. Defibrillation
12. Drugs used in ACLS
13. Emergency Cardiac pacing
14. AED
15. Techniques for oxygenation and ventilation
16. Role of dialysis technologist & dialysis therapist.

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Recent Advancements in Renal replacement therapies Practical's (60 Hours)

1. Current research and recent advances in dialysis technology
    a. Newer dialysis technologies
    b. Wearable artificial kidney
    c. Bio artificial kidney
    d. New sorbent technologies
2. Information technology and dialysis
    a. TDMS
    b. Patient Online
    c. Web based education,
    d. Short message service (SMS) texting
    e. Mobile apps
    f. Telemedicine in dialysis practice
    g. Other IT delivery methods
3. Home Hemodialysis
    a. Indications and contraindications of home hemodialysis
    b. Technical aspect of dialysis- legal, water preparation (plumbing), electrical considerations including backup power supply, dialysis machine choice and other equipment, space considerations and siting of dialysis machine, hygiene, and noise, safety, medical staff and technical support, disposal of waste, storage of medication
    c. Psychological aspect of home hemodialysis.
    d. Advantages and disadvantages of conventional home dialysis
    e. Impact on daily hemodialysis
4. Nocturnal hemodialysis
    a. Brief note on nocturnal hemodialysis
    b. Advantages of longer, slower dialysis
    c. Nocturnal dialysis in a dialysis center
5. Artificial Intelligence in renal replacement therapies
6. Application of nanotechnology, microfluidics, bioreactors with kidney cells, and miniaturized sorbent systems
7. New Techniques of Pediatric Dialysis
    a. NIDUS
    b. Carpediem
8. Other Recent Advances in Dialysis Therapy

Basic and advanced cardiac life support practical (30 Hours)

1. ACLS and BLS
2. Use of defibrillator and AED
3. Management of Shock and Hypotension

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Clinical Postings (270 Hours)

Students will continue with their previous clinical procedures and other special procedures with the assistance of a senior dialysis technologist. They are also allowed to view the renal transplant procedure along with internee.

Areas to be covered:

- Dialysis unit
- ICU
- Operation Theater for Observing AVF/AVG Creation, PD catheter Insertion & Renal Transplantation.
- BLS and ACLS

Seventh and Eighth Semester

Compulsory Rotatory Internship (2160 Hours)

The internship will span 1 year/ 2 semesters. This will include 8 hours of practice a day, totaling to 2160 hours for two semesters.

As a part of this, the students will choose a relevant subject and prepare an in-depth project report of not less than 1000 words which will be handed over to the supervisor or trainer. The report can include objective, scope of the project and an in-depth report.

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in simulation and treatment delivery. Students will demonstrate competence in beginning and intermediate procedures. Students will observe the advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

Project / Thesis/ Dissertation (180 Hours)

Each candidate will have to carry out a dissertation/ Project on the related subject. The dissertation will be guided by one or two members of the faculty of the department.

Elective Courses

Introduction to Healthcare Delivery System in India (30 Hours)

The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

1. Introduction to healthcare delivery system
    a. Healthcare delivery system in India at primary, secondary and tertiary care
    b. Community participation in healthcare delivery system
    c. Health system in developed countries.
    d. Private Sector
    e. National Health Mission

f. National Health Policy
g. Issues in Health Care Delivery System in India

2. National Health Program- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Program
3. Introduction to AYUSH system of medicine
    a. Introduction to Ayurveda.
    b. Yoga and Naturopathy
    c. Unani
    d. Siddha
    e. Homeopathy
    f. Need for integration of various system of medicine
4. Health scenario of India- past, present and future
5. Demography & Vital Statistics-
    a. Demography – its concept
    b. Vital events of life & its impact on demography
    c. Significance and recording of vital statistics
    d. Census & its impact on health policy
6. Epidemiology
    a. Principles of Epidemiology
    b. Natural History of disease
    c. Methods of Epidemiological studies
    d. Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

Basic computers and information science (45 Hours)

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation. Topics to be covered under the subject are as follows:

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
8. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system.
10. Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
11. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
12. Application of Computers in clinical settings.

Practical on fundamentals of computers –

1. Learning to use MS office: MS word, MS PowerPoint, MS Excel.
2. To install different software.
3. Data entry efficiency

Communication, soft skills & English (30 Hours)

Topics to be covered under Communication & Soft Skills course –

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.
4. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication
7. Barriers of communication & how to overcome

Topics to be covered under English course –

1. Spoken Communication
    a. Learning to read the phonetic symbols
    b. Stress
    c. Intonation
    d. Rhythm
    e. Commonly mispronounced words
    f. Correct pronunciation of important commonly used words in hospital practice

2. Vocabulary and Reading
    a. Special features of English vocabulary
    b. Common errors in choice of word
    c. Semi technical vocabulary
    d. Collecting material from library on scientific topics
    e. Comprehensive exercises
3. Writing
    a. Writing letters regarding permission, leave, opening bank account etc.
    b. Taking notes from lecture / reading materials
    c. Writing reports on patient care
    d. Summarizing scientific passages
4. Grammatical and Idiomatic Usage
    a. Correction of errors
    b. Types of interrogative sentences
    c. Active-Passive voice
    d. Tense
    e. Principles of procession, clarity and specificity

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Competency

Professional conduct: Backed by philanthropy, compassion, integrity, and excellence, a dialysis technologist is to adhere to the utmost conduct of professionalism. They are to provide their services, to patients with renal failure requiring renal replacement therapies, with professional codes and ethical conduct as their core values. They are to be a team player, effective in communication, provide the best care, to keep the patients safe & protected. They are to understand their limitations while continuing to keep themselves educated and updated with the current dialysis therapy practices.

PERFORMANCE CRITERIA	INDICATOR			*Measurement criteria*
	Knowledge	*Skill*	*Behaviour*	
Ability to consider a patient's health as their utmost priority.	1. Understand & explain the basic concept of health sciences related to human anatomy, physiology, pathology, biochemistry, microbiology, and pharmacology. 2. Comprehend & explain applied renal anatomy, physiology, microbiology, pathology, pharmacology, biochemistry & renal nutrition. 3. Understand & explain the practice of medical sociology & psychology in dialysis therapy.	1. Identify the patient's needs & requirements based on their clinical presentation & lab workups. 2. Explain Renal Replacement Therapy options & demonstrate patient education to help them choose the optimal therapy. 3. Plan the prescription of dialysis therapy. 4. Identify & plan a dynamic patient-tailored renal diet consultation & plan renal diet/nutrition.	1. Greet & respect patient & their attendants with care & appropriate manners. 2. Understand & empathize with a patient's psychological & social issues while constructively communicating with them. 3. Ensure equal care & treatment are given to all patients. 4. Respect patients regarding their care plan decisions.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Self-assessment & Peer-assessment 7.Viva-voce

Ability to independently deliver the best quality dialysis therapies & extracorporeal blood therapies with excellent clinical competency.	1. Comprehend & explain the principles of renal replacement therapies & each modality, their technical requirements, complications & management, apparatus, troubleshooting, vascular access, etc. 2. Comprehend & explain the principles & modalities of extracorporeal blood therapies, their technical requirements, complications & management, apparatus, troubleshooting, vascular access, etc. 3. Comprehend & explain the concept of renal transplantation & coordination (both pre & post transplantation).	OVERALL DIALYSIS THERAPY CARE TO THE PATIENT: a. Independently demonstrate & perform hemodialysis, peritoneal dialysis, and extracorporeal blood therapies. b. Independently demonstrate & perform AVF/AVG cannulation & Central Venous catheter handling. c. Demonstrate basic renal nursing care in dialysis patients- safe injection practices, blood & blood products transfusion, IV cannula insertion, IV antibiotic administrations, emergency medication administration during intradialytic complications, anticoagulant iv injections, EPO & iron injections, the	1. Demonstrate good interpersonal relationships with the dialysis team. 2. Demonstrate critical thinking & conflict management. 3. Demonstrate leadership & navigation qualities at the workplace. 4. Demonstrate adaptability to different situations & environment at the workplace. 5. Demonstrate good working conduct under stressful situations. 6. Respect patient's decision of discontinuing therapies/treatment under the supervisor/nephrologists' supervision.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem-based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning

	4. Comprehend & explain the complications of dialysis therapies their management & treatment. 5. Understand & describe the concept of biomedical instrumentations/electronics used in dialysis therapies. 6. Understand & describe the basic nursing care in dialysis therapies to provide total patient care. 7. Understand & describe the concept of research methodology. 8. Emphasize & understand the recent advances in dialysis therapies & the utilization of AI in dialysis therapies.	concept of the crash cart, etc. d. Demonstrate BLS & ACLS. ASSEMBLE PATIENT HISTORY: 1. Obtains the case history. 2. Makes general observations of patients. 3. Obtains and interprets patient information from other professionals. PATIENT ASSESSMENT: 1. Formulates an examination plan. 2. Implements the plan. 3. Pre & post assessment of dialysis INFECTION CONTROL PRACTISES AND UNIVERSAL PRECAUTION: a. Demonstrates appropriate use of barrier precautions. b. Recalls and demonstrates sharp instruments and prevents needle stick injuries through education.		

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		c. Properly demonstrates appropriate cleaning and disinfecting of surfaces and equipment. d. Properly dispose of contaminated or infectious waste. e. Properly performs isolation procedures for patient care during dialysis. f. Properly obtains and handles isolation blood specimens and infection control measures. OPERATION AND MAINTENANCE OF DELIVERY SYSTEM a. Properly demonstrate the operational handling of the HD delivery system. b. Properly initiates, performs & documents all types of disinfections & rinses. c. Properly demonstrates sodium profiling and UF profiling.		

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		d. Operate routine maintenance, identification of a malfunction, troubleshooting, and minor repair for all equipment used in dialysis units such as hemodialysis machines, water treatment plants, dialyzer reprocessing machines, etc. VASCULAR ACCESS PROCEDURES: a) Ability to properly assess the vascular access for function, and integrity, handling all types of vascular access for Hemodialysis. b) Efficiently initiate the use of all types of vascular access (temporary & permanent) for hemodialysis as well as terminate the use of the same. MANAGING ACUTE EMERGENT COMPLICATIONS ON DIALYSIS: a. Recalls and/or responds properly to all types of intradialytic		

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		complications & patient clinical complaints pertaining to the hemodialysis therapy. (Hypotension, cramps, nausea, body pain, chest pain, breathlessness, etc.) b. Ability to properly handle mechanical complications such as air embolism, hemolysis, blood leak, dialyzer reactions, etc. c. Recalls and/or responds properly to all vascular access-related complications such as infected catheter handling, needle infiltration, bleeding, swelling, hematoma, etc. DIALYSATE PREPARATION PROCEDURES: a. Efficiently demonstrates the preparation of both manual & machine preparation of dialysate concentrates.		

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		b. Efficiently performs manual conductivity, temperature, and pH tests of the dialysate concentrates. c. Efficiently demonstrates the disinfection of the dialysate preparing equipment & the microbiological surveillance of the dialysate concentrates. WATER TREATMENT PROCEDURES: a. Efficiently demonstrates the operation of the RO equipment and the various parts of the water treatment plant. b. Efficiently performs tests for the system such as TDS, water hardness test, chlorine or chloramine test, water pressure drops monitoring, microbiological surveillance sample collection, etc. c. Efficiently demonstrates documentation skills of each procedure.		

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		PERITONEAL DIALYSIS: a. Demonstrates the ability to assess a patient for PD & initiate PD therapy & perform CAPD exchanges according to unit policy and complete the prescription. b. Demonstrates the delivery of efficient patient education/counseling. c. Demonstrates efficient patient pre/post-PD catheter insertion care. d. Demonstrates the ability to line/set up the home choice machine. e. Demonstrates the ability to troubleshoot PD complications (infectious & mechanical complications) including peritonitis while administering permitted drugs as per hospital policy (e.g., Heparin during dialysis).		

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		f. Demonstrates the ability to collect PD samples and follow unit protocol, documents findings correctly & perform adequacy and PET test. g. Demonstrates the ability to train a patient or carer to perform CAPD or APD and an exit site dressing. RENAL TRANSPLANTATION: a. Assess the physiological and psychological functioning of the transplant recipient with monitoring and review of treatment plans in conjunction with the renal transplant team. b. Facilitate the donor and recipient preparation such as motivation and the psychosocial readiness of the prospective		

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		donor, medical screening prior to transplant and post-transplant follow-up along with the transplant team along with assessing the health and suitability of a prospective living organ donor. c. Demonstrate efficiently the pre-transplantation counseling and guidance, pertaining informed consent forms from donor and recipient along with the transplant team following all the protocols. d. Identify, counsel, and influence patients who are not adhering to their medication regime, help facilitate them in developing approaches to lifestyle and health management and educate the patient on post-transplant immunosuppre		

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		ssive medications along with the treating nephrology team. e. Patient and donor workup including committee approval and coordinating between a nephrologist, urologist, donor surgeon, and anesthesia team. f. Facilitate the updating of the cadaver transplant waitlist. ICU RRT and CRRT: a. Perform dialysis therapies & extracorporeal blood therapies in critically ill patients in different types of ICUs- Surgical, Medical, Isolation, Cardio-thoracic, Pediatric, Neuro, Coronary Care ICU, etc. b. Perform dialysis therapy & extracorporeal blood therapies for infectious patients- Covid-19,		

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		H1N1, Viro-positive, MRSAs, TB, etc. c. Perform dialysis therapies & extracorporeal blood therapies in special cases- Pediatric, geriatric, autistic, pregnant women, differently abled patients, etc. d. Identifies all the various parts of the extracorporeal blood therapy equipment & assembles equipment required for the CRRT circuit including the emergency equipment required at the bedside & their efficient utilization. e. Efficiently demonstrate the troubleshooting of alarms & clinical complications. f. Demonstrates the apparatus preparation, connection & termination efficiently.		

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		REPROCESSING OF DIALYSER, TUBING, etc.: a. Initiate, monitor, and terminate both manual and automated reprocessing of dialyzer and tubing. b. Efficiently demonstrate the dilution & storage of disinfectants. c. Efficiently demonstrates the troubleshooting of automatic dialyzer reprocessing machine. d. Efficiently demonstrates the visual identification of a condemned dialyzer/blood tubing. PLASMAPHERESIS: a. Demonstrate and perform the safe and appropriate operation of the apheresis machines currently. b. Be able to demonstrate knowledge of the relevant standard operating procedure(s).		

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		c. Procedure commencement, monitoring, and post-procedure care. OTHER SPECIAL PROCEDURES: Hemoperfusion, MARS, Liver Dialysis, and other extracorporeal therapies: a. Initiate, and perform safe termination of appropriate operation of the Hemoperfusion technique, including management of alarm conditions, troubleshooting, and maintenance. b. Initiate, and perform safe termination of appropriate operation of the MARS technique, including management of alarm conditions, troubleshooting, and maintenance. c. Initiate, and perform safe termination of appropriate operation of the Liver Dialysis technique, including management of		

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		alarm conditions, troubleshooting, and maintenance. d. Initiate, and perform safe termination of appropriate operation of the extracorporeal techniques including management of alarm conditions, troubleshooting, and maintenance. MANAGERIAL ROLES: a. Development & planning of a dialysis unit for a standalone organization or a healthcare set-up. b. Assist the dialysis unit manager/supervisor in inventory & logistic management. COORDINATE WITH NEPHROLOGISTS / PHYSICIAN/ SURGEONS IN CERTAIN PROCEDURES: a. Coordinate with nephrologists in a renal biopsy, central venous line catheterization & PD catheter insertion & Organ Transplantation		

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Ability to administer prescribed medications during dialysis.	1. Comprehend & explain the pharmacology related to dialysis therapy. 2. Explain the common medications & emergency medications administered in dialysis patients. 3. Knowledge of the International Patient Safety Goals & the rights of drug administration	1. Demonstrate administration of anticoagulant (e.g., Injection heparin) & coagulant agents used during dialysis. 2. Demonstrate efficient application of the International Patient Safety Goals & the rights of drug administration during dialysis therapy. 3. Demonstrate administration of common drugs & emergency drugs via different routes during dialysis therapy such as ESA injections, iron sucrose injections, MVI, antihistamines, NSAIDs, antibiotics, etc., under the supervision of the nephrologist/physicians	1. Demonstrate honesty & integrity while medication handling. 2. Avoids discrimination & malpractice which may impair their professional judgment/actions, compromising the delivery of dedication for the best interest of the patients.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer assessment 9.Problem-based & Case based learning exercises 10.Viva voce
Ability to understand & respect a patient's rights, dignity & confidentiality, as well as that of other healthcare	1. Understand & describe the patients' rights & responsibilities and confidentiality in a healthcare set-up & in a dialysis unit.	1. Maintains confidentiality of patient records. 2. Ensures that data is organized in a legible, secure, accessible, permanent, and	1. Restrict from discussing patients' confidential information & conditions/matters related to this in any open forum/external communications.	1.Summative assessment 2.Formative assessment 3.OSCE, OSPE 4.Clinical posting & logbooks

professionals	2. Understand & describe the rights & responsibilities of healthcare workers in a dialysis unit.	unambiguous manner. 3. Demonstrate excellent documentation skills with record-keeping abilities. 4. Maintain cordial relationships with other healthcare professionals.	2. Demonstrate good communication skills & IPR with the dialysis therapists, nephrologists, nurses & the multidisciplinary team at the workplace. 3. Honesty & understanding of self-limitations.	5.Self-assessment & Peer-assessment 6.Problem-based & Case based learning exercises. 7.Viva voce
Ability to adhere to healthcare & safety policies and quality assurance.	1. Understand & explain hospital infection control policies, quality assurance & patient safety, and basic principles of management in healthcare & in the dialysis units.	1. Understand & demonstrate the emergency codes protocols- Code Red, Code Blue, Code Yellow, Code Pink, Code Violet, etc. 2. Develop SOPs for a dialysis therapy unit. 3. Demonstrate hospital infection control practices- hand hygiene, machine disinfection, dialyzer reprocessing, RO water system disinfection, handling seropositive & infectious patients, etc.	1. Proactive approach & alertness to the surrounding for any health & safety issues. 2. Courteous & friendly support to the patients making the dialysis therapists accessible, promoting patient satisfaction.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem-based & Case based learning exercises. 10.Viva voce

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Ability to adhere to legal, professional, and ethical guidelines, laws & codes.	1. Understand & describe the medical terminologies & medical ethics, law & codes in a healthcare set-up & dialysis unit.	1. Explain invasive procedures & collect informed consent forms for central venous line insertion, high-risk consent forms, dialysis consent forms, etc. 2. Legal documents handling in the coordination of pre & post-renal transplantation. 3. Follow the code of conduct regulated by the respective authorities.	1. Honesty & integrity in observing medical ethics, laws & codes. 2. Respect the patient's right to information & confidentiality. 3. Dress appropriately with IDs & as per the institute's policy. 4. Establish professionalism & ethical values in the workplace.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Self-assessment & Peer-assessment
Ability to continue in the academic arena, training & facilitating the students as well as dialysis staff.	1. Comprehend all the basic health sciences, and their implementations in the clinical arena. 2. Comprehend the dialysis therapy modalities, their prescription, complications & treatment/management. 3. Comprehend renal transplantation & coordination.	1. Demonstrate & facilitate students, trainees & interns on dialysis therapy modalities as a clinical demonstrator/instructor. 2. Function as a Tutor in the academic arena. 3. Develop training curriculums & materials for clinical training, demonstrations, externship candidates, etc.	1. Always presentable & dress appropriately. 2. Respects & greets the faculties & students. 3. Show good communication & comprehensive proficiency. 4. Maintains good IPR with the clinical team.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4. OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment

	4. Comprehend & explain the dialysis therapies in special populations & circumstances .	4. Participate & assist in research activities.		9.Problem-based & Case based learning exercises

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5.3 Master of Dialysis Therapy (MDT)

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Master of Dialysis Therapy (MDT)

Introduction:

The Master of Dialysis Therapy (MDT) is specifically aimed at those pursuing a professional career in Dialysis Therapy. It is designed to provide specialized training both in basic scientific principles of modern Dialysis Therapy and in the application of these principles to the understanding of a wide variety of renal-uro disorders. It is designed as a higher degree program suitable for graduates having experience in Dialysis Therapy.

It is designed to provide training for a future career in research in basic and clinical renal science. The program aims to enhance the scientific skills of clinicians and to provide non-clinical graduates with insight into clinical problems that will allow them to work alongside clinicians in clinical research projects.

Learning Objectives:

Upon successful completion of the Masters' program, students will have developed a broad knowledge of the contribution of basic renal scientific mechanisms to clinical disorders of the excretory system. In particular they will:

1. Understand how mechanisms operating at the molecular, cell, network and system sub-level serve normal function and how damage or dysfunction at these different levels produces specific disorders of importance to clinical dialysis therapy.
2. Have a good working knowledge of modern methods for scientific and clinical investigation of the renal system.
3. Be aware of the major recent developments in research in the area of clinical dialysis therapy.
4. Be able to embark upon a successful career in their chosen direction of advanced nephro- research.

Scope of Curriculum & Expectation from the future graduate in the providing patient care

1. The primary goal of the Master of Dialysis Therapy program is to prepare accomplished professionals in Dialysis Therapy with a specific emphasis on clinical skills and technical knowledge along with professional research.
2. Trainees acquire the research-based knowledge and procedural skills necessary to deliver a high standard of care to the patients with chronic kidney disease requiring renal replacement therapy.
3. This course involves all aspects of care for patients undergoing chronic hemodialysis, continuous ambulatory peritoneal dialysis (CAPD) and other extracorporeal therapies.
4. Overall goal of this training is to foster the trainee's development into an independent care provider and researcher in the field of dialysis.
5. The program intends for its post graduates to contribute to a new generation of academic dialysis professional equipped to address the challenging problems in renal replacement therapy and Other Extracorporeal Therapies.

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Eligibility for admission:

1. Bachelor in Dialysis Therapy Technology

Duration of the program

Duration of the program is 2 years or 4 semesters with 945 hours of Lecture & 1440 hours of Practical Training.

Total number of hours – 2385

Total Credits: 104

Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

Attendance:

A candidate has to secure minimum -

1. 80% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

Assessment:

Cognitive Assessment

Structured logbook
Viva-voce examination.
Structured case presentation
Formative assessment
Summative assessment
Case presentation

Psychomotor Assessment

Objective Structured Clinical Examination (OSCE)
Objective Structured Practical Examination (OSPE)
Mini Clinical Evaluation Exercise (Mini-CEX)
Direct Observation of Procedural Skills (DOPS)
Simulation-based assessment

Marks qualifying for a pass

For University examination subjects:

50% in internal assessment, 50% in university theory examination, 50% in university practical examination and 50% in aggregate

For thesis and defence:

50% in aggregate

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Curriculum Schemes

Semester I																
Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester				Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours				Theory (b)	Practical/ Viva (c)	Theory: a+(b*2) = 100 Practical: a + c = 100
MDT001	Anatomy (Basic anatomy/ Nephroanatomy / Embryology/ Histology)	A	4			4	60		60		80	50	100		100
MDT002	Physiology (General physiology/ Nephrophysiology/ Endocrinology)	B	4			4	60		60		80	50	100		100
MDT003	Biochemistry	C	4			4	60		60		80	50	100		100
MDT004	Microbiology	D	4			4	60		60		80	50	100		100
MDT005	Renal Genetics & Molecular Biology		4			4	60		60		80	50	100		100
MDT006	Anatomy (Practical)	A			2	2		60	60		80	50		50	100
MDT007	Physiology (Practical)	B			2	2		60	60		80	50		50	100
MDT008	Biochemistry (Practical)	C			2	2		60	60		80	50		50	100
MDT009	Microbiology (Practical)	D			2	2		60	60		80	50		50	100
MDT010	Residency - 1			2		2		90	90		80	50		50	100
	Total		20	2	8	30	300	330	630			500	500	250	1000

Semester II																
Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester				Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours				Theory (b)	Practical/ Viva (c)	Theory: a+(b*2) = 100 Practical: a + c = 100
MDT011	Renal Pathology	E	4	-	-	4	60	-	60		80	50	100	-	100
MDT012	Pharmacology	F	4	-	-	4	60	-	60		80	50	100	-	100
MDT013	Nephro-Immunology	G	3	-	-	3	45	-	45		80	50	100	-	100
MDT014	Research Methodology and Biostatistics		4	-	-	4	60	-	60		80	50	100	-	100
MDT015	Biophysics & Biomedical Instrumentation		2	-	-	2	30	30	60		80	50	100	-	100
MDT016	Elective Course (To be chosen by the student)		3	-	-	3	45	-	45		80	50	100	-	100
MDT017	Renal Pathology (Practical)	E	-	-	1	1	-	30	30		80	50	-	50	100
MDT018	Pharmacology (Practical)	F	-	-	1	1	-	30	30		80	50	-	50	100
MDT019	Nephro-Immunology (Practical)	G	-	-	1	1	-	30	30		80	50	-	50	100
MDT020	Residency - 2		-	3	-	3	-	135	135		80	100	-	50	100
	Total		20	3	4	27	300	255	555			500	600	200	1000

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Semester III														
Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester			Attendance %	Continuous Internal assessment CIA - Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours			Theory (b)	Practical/ Viva (c)	Theory: a+(b+c) =100 Practical: a + c = 100
MDT021	Renal Disease	H	4	-	-	4	60	-	60	80	50	100	-	100
MDT022	Emergency Medicine and Renal Nutrition& Dietetics	J	3	-	-	3	45	-	45	80	50	100	-	100
MDT023	Nephro- Radiology and Imaging sciences	J	4	-	-	4	60	-	60	80	50	100	-	100
MDT024	Renal Disease (Practical)	H	-	-	1	1	-	30	30	80	50	-	50	100
MDT025	Emergency Medicine and Renal Nutrition & Dietetics (Practical)	J	-	-	1	1	-	30	30	80	50	-	50	100
MDT026	Nephro- Radiology and Imaging sciences (Practical)	J	-	-	1	1	-	30	30	80	50	-	50	100
MDT027	Residency - 3		-	5	-	5	-	225	225	80	100	-	-	100
MDT028	Seminar on Dissertation		-	-	3	3	-	90	90	80	100	-	-	100
Total			11	5	6	22	165	405	570		500	300	150	800

Semester IV														
Course Code	Course	Result in Group (RG) #	Credit/ Week				Hours/ Semester			Attendance %	Continuous Internal assessment CIA- Theory/ Practical (a)	End Semester		Grand Total
			Lecture	Tutorial/ Clinical Training	Practical/ Research Project	Credits	Lecture	Practical/ Tutorial	Total Hours			Theory (b)	Practical/ Viva (c)	Theory: a+(b+c) =100 Practical: a + c = 100
MDT029	Advanced Renal Replacement Therapy	K	4	-	-	4	60	-	60	80	50	100	-	100
MDT030	Renal transplantation and coordination/Psychology	L	4	-	-	4	60	-	60	80	50	100	-	100
MDT031	Quality assurance and management of Dialysis unit	M	4	-	-	4	60	-	60	80	50	100	-	100
MDT032	Advanced Renal Replacement Therapy (Practical)	K	-	-	1	1	-	30	30	80	50	-	50	100
MDT033	Renal transplantation and coordination/Psychology (Practicals)	L	-	-	1	1	-	30	30	80	50	-	50	100
MDT034	Quality assurance and management of Dialysis unit (Practical)	M	-	-	1	1	-	30	30	80	50	-	50	100
MDT035	Residency - 4		-	8	-	4	-	180	180	80	100	-	-	100
MDT036	Dissertation and viva voce		-	-	6	6	-	180	180	80	50	-	50	100
Total			12	4	9	25	180	450	630		450	300	200	800
Grand Total			63	14	27	108	945	1440	2385		1950	1700	800	3600

Results in Group (RG) – For Programs wherein Theory and Practical's (Lab Course) are assessed jointly (RG), the passing minimum for the theory exams and Practical exams have to be obtained separately, in order to be declared passed in the individual courses and thereby earning the credits for both Theory and Practical courses. Reappearance in any one of the components(Theory or Practical) is treated as reappear in both these components (Theory and Practical's).

Anatomy (60 Hours)

1. Anatomical Terminology: Descriptive anatomical terms, terms related to movement and position.
2. Skeletal system-Name and parts of the Bone and joints
    a. Skeleton, skull, vertebrae, pelvis, ribs, principal joints-Hip joint, Shoulder joint, Sacroiliac joint.
    b. Lumbar vertebra and pelvis in detail
3. Muscular system – Classification, Types, Attachment, Action and nerve supply of the Muscles of Abdomen and Pelvis
4. Cardiovascular system – Heart and Major Blood Vessels- arteries of upper limb, lower limb, - Arch of Aorta and its Branches Abdominal Aorta and its branches, Inferior Vena cava and its Tributaries, Pericardium& Pericardial sinuses.
5. Heart: -External and Internal features
    a. Structure of the heart
    b. Conducting system of the heart,
    c. Blood supply of the Heart
    d. Nervous supply of the heart
    e. Valves of the heart
6. Respiratory system – Pleura and recesses
7. Mediastinum–Superior, Anterior, posterior, middle Mediastinum, Trachea, Larynx, Principal Bronchus
8. Lungs-: Lobes and Fissures–Right Lung, Left lung
9. Bronchopulmonary Segments-Blood Supply to the lungs, Lymphatic drainage of the lungs, Nerve supply of the lungs
10. Nerve supply of Abdomen and pelvis- Lumbar & sacral plexus in detail.
11. Lymphatics of Abdomen and pelvis
12. Peritoneal Cavity– Peritoneum, Folds and Recesses
13. Urinary system: Organs –Kidney, Ureter, Bladder and Urethra
14. Male Reproductive system
15. Female Reproductive system
16. Regional–Cubital Fossa, Inguinal canal, Femoral Triangle and Adductor canal
17. Embryology: Urogenital System-Development of-Kidney, ureter, urinary bladder, urethra, prostate, uterus, uterine tube, vagina, male external genitalia, female external genitalia
18. Histology of kidney, ureter, urinary bladder & urethra

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PHYSIOLOGY (60 Hours)

Introduction to physiology: The cell and general physiology-Functional organization of the human body and control of the "Internal Environment"-Homeostasis-Regulation of body functions the cell and its function-Physical structure of the cell-Functional systems of the cell Genetic control of protein synthesis, cell function and cell reproduction-RNA-Cell differentiation

Temperature regulation: Body Temperature-Heat production & loss- role of hypothalamus- neuronal effectors mechanism-body temp-Behavior control-local skin temperature-Fever-Exposure to cold.

Nephro-Endocrinology: Introduction to endocrinology The pituitary hormones and their control by the hypothalamus: The pituitary Gland and its relation to the hypothalamus – control of pituitary secretion by the hypothalamus – physiological functions of growth hormone – The posterior pituitary gland and its relation to the hypothalamus The thyroid metabolic hormones: Formation and secretion of the thyroid hormones – functions of the thyroid hormones in the tissues – regulation of thyroid hormone secretion – disease of the thyroid. The adrenocortical Hormones: Chemistry of Adrenocortical secretion – Functions of the mineralocorticoids-aldosterone – Functions of the glucocorticoids – The adrenal androgens – Abnormalities of adrenocortical secretion. Insulin, Glucagon and diabetes mellitus: Insulin and its metabolic effects Glucagon and its functions – somatostatin – hyperinsulinism. Parathyroid hormone, Calcitonin, calcium and phosphate metabolism, vitamin D, Bone and Teeth: calcium and phosphate in the extracellular fluid and plasma-function of vit D – Bone and its relationships to extracellular calcium and phosphates – parathyroid hormone – calcitonin – overall control of calcium Ion concentration – physiology of parathyroid and bone diseases

The Kidneys and Body Fluids

The body fluid compartments: extracellular and intracellular fluids interstitial fluid and Edema

a. Body fluid compartments
b. Constituents of extracellular and intracellular fluids
c. Osmotic equilibrium and fluid shifts between the extracellular and intracellular fluid
d. Changes in the volumes and osmolalities of the extracellular and Intracellular fluid compartments in abnormal states
e. Edema fluids in the potential spaces of the body

Formation of urine by the kidney: Renal Blood Flow, Glomerular filtration and their Control.

a. Physiologic anatomy of the kidney
b. Basic theory of nephron function
c. Renal blood flow and pressures
d. Glomerular filtration and the glomerular filtrate

e. Control of the glomerular filtration rate and renal blood flow
f. Reabsorption of fluid by the peritubular capillaries

Formation of urine by the kidney: Processing of the filtrate in the tubules

a. Effect of tubular load and tubular transport maximum on urine constituents
b. The concept of Plasma Clearance its use in assessing renal function

Renal associated mechanism for controlling extracellular fluid osmolality and sodium concentration.

a. The mechanism for excreting excess water: Excretion of a dilute urine
b. The mechanism for excreting excess solutes: The countercurrent mechanism for excreting a concentrated urine
c. Control of extracellular fluid osmolality and sodium concentration
d. Sodium excretion and its control by aldosterone

Renal regulation of Blood volume and extracellular fluid Volume: Excretion and regulation of urea, potassium, and other substances

a. control of blood volume
b. control of extra cellular fluid volume
c. urea excretion
d. Potassium excretion
e. Control of the extracellular concentrations of other ions

Regulation of Acid-Base Balance

a. Function of Acid – Base Buffers
b. Respiratory regulation of Acid – Base balance
c. Renal control of Hydrogen Ion concentration
d. Clinical abnormalities of Acid-Base Balance

Renal Disease, Diuresis, and Micturition

a. Renal Disease
b. Renal Function tests
c. Diuretics and mechanisms of their actions
d. Micturition

Biochemistry (60 Hours)

1. Chemistry and metabolism of Carbohydrates
2. Chemistry and metabolism of Lipids
3. Chemistry and metabolism of proteins
4. Chemistry and metabolism of nucleic acids
5. Enzymes and vitamins, biological oxidation
6. Water and minerals
7. Hemoglobin chemistry and metabolism
8. Acid- Base balance

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9. Renal functions tests(Renal function Formation and composition of urine–Specific gravity and pH, solids and 24 hour urine, abnormal constituents of urine- Glycosuria-glycosuria, fructosuria, pentosuria, lactosuria, galactosuria. Proteinuria, Ketone bodies, Bile pigments and bile salts, Blood, porphyrins, Urinary lithiasis).
10. LFT
11. Detoxification
12. Hormones
13. Energy metabolism
14. Elements of Biochemical Genetics & Inborn errors of metabolism
15. Classification, mechanism of action of hormones regulating hormones calcium and phosphorous.
16. Regulation of pH of Blood and body fluids: Regulatory mechanisms, Renal Mechanism, Disturbances in acid-base balance, respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis, assessment of the acid-base balance, carbon-dioxide combining power of blood, alkali reserve, anion gap
17. Overview of estimation of serum creatinine, blood urea, serum electrolytes, 24 hrs. Urinary protein –Lab methods.

Microbiology (60 Hours)

Objectives:

1. To have the basic knowledge about the general characteristics of bacteria.
2. To understand the principles of immunology.
3. To learn about the application of Microbiology and Immunology in dialysis.

Theory

1. Classification, Morphology, and nutritional requirements of bacteria.
2. Sterilization, disinfection, and antimicrobial agents.
3. Normal flora of human body, infection, sources, and modes of transmission of infection.
4. Immunity: Innate immunity, acquired immunity, humoral and cell mediated immunity.
5. Antigen, antibody & complement.
6. Structure and functions of immune system and immune response.
7. Hypersensitivity and transplant immunology.
8. Pyogenic cocci.
9. Aerobic and anaerobic spore bearers & Corynebacterium.
10. Mycobacteria.
11. Enterobacteriaceae, Pseudomonas & Vibrio
12. Spirochetes.
13. General properties of viruses.
14. Hepatitis, HIV & CMV.
15. Oncogenic viruses & antiviral drugs.
16. Opportunistic, parasitic, and fungal infections and Nosocomial infections.
17. Diagnostic microbiology: An approach to lab diagnosis of microbial infections.

18. Hospital infection- Causative agents, transmission methods, investigation, prevention, and control
19. Biomedical waste management

Renal genetics and molecular biology (60 Hours)

1. Introduction, Cell, Cell Organelles, cell Cycle, and Cell division
2. Nucleic Acids – Structure, Function, and Chemical Properties, DNA, RNA
3. Introduction to Clinical Genetics, Glossaries, Genome Organization, Mutations:- Types, Pedigree analysis, Inheritance pattern, Genetic syndromes, and Inborn errors of metabolism
4. Genetics of Renal disorders, polycystic kidney, Hereditary nephropathy, Urinary tract malformation, Renal Stones, Renal transport disorder, and concept of Counseling
5. Introduction to Molecular Biology
   a. Concept
   b. Molecular Biology
6. Identification of the genetic materials
7. Chemical nature of genetic materials
8. Replication of DNA
9. Non-genetic ribonucleic Acid(RNA)and transcription
10. Genetic code
11. Protein synthesis
12. Regulation of gene action
13. Stem cell research: principles and application

Anatomy Practical (60 Hours)

Spotters:

a. Identification of arteries.
b. Identification of veins.
c. Identification of organs.
d. Identification of muscles of abdomen.
e. Identification of vertebra, ribs and pelvis.

Discussion:

a. Development of urogenital system.
b. Histology of kidney, ureter, bladder and urethra.
c. Male and female pelvis.

Physiology Practical (60 Hours)

Hematology

1. Study of a compound microscope.

2. Estimation of hemoglobin (Shali's Method)

3. Determination of Total erythrocyte (RBC) count

4. Determination of RBC indices or blood standards

5. Determination of total Leucocytes (WBC) count

6. Preparation of peripheral blood smear and determination of different leucocyte count

7. Determination of BT & CT

8. Determination of Blood group (A, B, C, & Rh system)

9. Determination of specific gravity of blood 10. Determination of osmotic fragility of RBC

11. Determination of ESR & PCV

12. Determination of platelet count, reticulocyte, absolute eosinophil count

Clinical examination

1. An introduction to clinical examination

2. Clinical examination of the abdomen

3. Clinical examination of the Respiratory system

4. Clinical examination of the CVS

5. Clinical examination of the NS

Cardio-Vascular System

1. Recording system arterial Blood Pressure

2. Effect of posture and exercise on Blood pressure

3. Measurement of blood flow by venous occlusion plethysmography

Biochemistry Practical (60 Hours)

1. Analyars of abnormal Urine
2. Estimation of urea, creatinine, uric acid, Sugar. Cholesterol
3. Demonstration – Agarose gel electrophoresis of Serum Protein, Arterial blood gas analysis

Microbiology Practical's (60 Hours)

1. Compound microscope.
2. Demonstration of sterilization equipment's: hot air oven, autoclave, bacterial filters.
3. Demonstration of commonly used culture media, nutrient broth, nutrient agar, blood agar, chocolate agar, MacConkey medium, L J media, Robertson cooked meat media, Potassium tellurite media with growth, MacConkey medium with LF & NLF, NA with staph.
4. Anaerobic culture methods.
5. Antibiotic susceptibility test.

6. Demonstration of common serological tests: Widal, VDRL, ELISA.
7. Gram staining.
8. Acid fast staining.
9. Fungal Staining
10. Stool exam for helminthic ova & cysts.
11. Visit to hospital for demonstration of work done by infection control team and biomedical waste management department.

Residency –I (90 Hours)

In the residency the professional is expected to work and contribute to the Dialysis Therapy unit.

Areas to be Covered,

1. Blood Bank
2. PHC, CHC
3. OPD
4. Transplant Work Up
5. Emergency Medicine
6. Radiology
7. Psychiatric
8. Operation Theater for assisting in AVF, AVG Creation, Renal Transplantation and PD Catheterization

Second Semester

Renal Pathology (60 Hours)

1. Gross appearance, Histology of Kidney, outline and functions of kidney
2. Names of congenital anomalies and acquired cystic diseases
3. Broad outline of pathogenesis of Glomerular diseases. Immune mechanism- Types
4. Classification of glomerulonephritis – Names of the types with mention of pathogenesis
5. Clinical manifestation of glomerulonephritis
6. Glomerular lesions in systemic disease. List of disease and brief outline of lesions
7. Diseases affecting tubules and interstitium. Acute tubular necrosis etiology and clinical manifestations
8. Pyelonephritis and urinary tract infection. Etiology and clinical manifestations
9. Chronic pyelonephritis, reflux nephropathy. Etiopathogenesis and clinical manifestations
10. Drug and toxin induced nephropathy. Etiopathogenesis and clinical manifestation
11. Benign and malignant nephrosclerosis. Etiopathogenesis, clinical manifestation
12. Urolithiasis – Types of stones, pathogenesis
13. Obstructive uropathy. Etiopathogenesis clinical features
14. Acute renal failure
15. Chronic renal failure
16. Tumors of the kidney and urinary bladder classification (Names)
17. Urine analysis – Introduction
18. Physical

19. Chemical qualitative and quantitative
20. Urine analysis, Microscopic
21. Peripheral blood smear

Pharmacology (60 Hours)

General Pharmacological principle

1. Definitions, routes of drug administration
2. Pharmacokinetics
3. Pharmacodynamics
4. Adverse drug effects

Drugs acting on autonomic nervous system

1. ANS – general considerations
2. Cholinergic system and drugs
3. Anticholinergic drugs
4. Adrenergic system
5. Antiadrenergic Drugs

Antacoids

1. Analgesics
2. Opioid
3. Nonopioid

Bronchodilators

Hormones

Steroids

Central Nervous system

1. Local Anesthetics
2. General anesthetics
3. Ethyl and methyl alcohols
4. Sedative-hypnotics
5. Antiepileptic drugs
6. Drugs used in Mental illness

Cardiovascular drugs

1. Drugs affecting Renin- Angiotensin system and plasma kinins
2. Cardiac glycosides and drugs for CHF
3. Antiarrhythmic drugs
4. Antianginal drugs
5. Antihypertensive drugs
6. Diuretics

Blood

1. Hematinic and erythropoietin
2. Drugs affecting coagulation, bleeding and thrombosis
3. Hypolipidemic drugs and plasma expanders

Gastrointestinal drugs

1.Drugsforconstipation and diarrhea

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Chemotherapy

1. Antimicrobial drugs: General consideration
2. Sulfonamides, clotrimazoles and quinolones
3. Beta lactam antibiotics
4. Tetracycline and chloramphenicol
5. Aminoglycoside antibiotics
6. Macrolide and other antibacterial antibiotics treatment of UTI
7. Antitubercular drugs
8. Antifungal drugs
9. Antiviral drugs
10. Anticancer drugs
11. Immuno suppressants, gene therapy,
12. Chelating agents
13. Vaccines

Nephro-immunology (45 Hours)

Nature of the Immune system

1. Historical concepts and introduction to serological testing:
   b. Immunity and immunization
      a. Cellular verses humoral immunity
      b. Antigens and haptens
      c. Cells – mediated immunity
   c. The Age of serology
   d. Other historical developments
2. Natural Immunity:
      a. External defense system
      b. Internal defense system
         - Cellular Defense mechanism
         - Acute phase reactants
         - Inflammation
      c. Summary
3. The lymphoid system:
      a. Primary lymphoid organs
         - Bone marrow
         - Bursa of Fabricius
         - Thymus
      b. Secondary lymphoid organ
         - Spleen
         - Lymph nodes
         - Other secondary organs
      c. Surface marker on lymphocytes
      d. Stages in B-cell differentiation
         - Pro-B cells
         - Pre– B cells
         - Immature B cells

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- Mature B cells
- Activated B cells
- Plasma cells

e. T cells Differentiation
- Double– negative stage
- Double positive stage
- Mature T cells
- Antigen activation

f. Third population or natural killer
- Mechanism of cytotoxicity
- Antibody– Dependent cell

g. Laboratory identification of lymphocytes
- Fluorescence Microscopy
- Cell flow cytometry
- Other methods

h. summary

4. Nature of Antigens and the MHC Complex
   a. Factors influencing the immune response
   b. Traits of Immunogens
   c. Nature of epitopes
   d. Haptens
   e. Relationship of antigens to the Host
   f. Adjuvants
   g. Major Histocompatibility Complex
      - Genes coding for the HLA antigens
      - Class I Antigens
      - Class II antigens
      - Antigen presentation
      - MHC and Autoimmunity
5. Antibody structure and Function:
   a. Tetra peptide structure of immunoglobulin
      - Cleavage with papain
      - Pepsin digestion
   b. The Nature of Light Chains
   c. Heavy chain sequencing
   d. Antigen recognition unit
   e. Hings region
   f. IgG
   g. IgM
   h. IgA
   i. IgD
   j. Ige
   k. Theories of antibody diversity
   l. Genes coding for immunoglobin
   m. Monoclonal antibody
   n. Summary

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6. Cell-Mediated Immunity:
    a. Activation of T Helper cells
        - Adhesion Molecules
        - Specific Antigen recognition
        - Function of Interleukin-2
        - Triggering of Interleukin-1
        - T- Helper subsets
    b. Stimulation of B cells
    c. Activation of cytotoxic T cells
        - Role of cytokines in the inflammatory response
        - I-1, I-2, I-3, I-4, I-5, I-6, Other I , Interferon's, TNF, other factor
    d. Laboratory determination of T lymphocyte function
    e. Summary
7. Complement:
    a. The classic pathway
        - The recognition unit
        - The activation unit
        - The membrane attacks
    b. The alternative pathway
    c. System controls
        - fluid phase regulators
        - cell – bound regulators
    d. Other cell membrane Receptors
    e. Biologic manifestation of complement activation
    f. Complement and Diseases states
    g. Complement Deficiencies
        - Paroxysmal Nocturnal Hemoglobinuria
        - Other complement
    h. Laboratory detection of complement abnormalities
    i. Summary
8. Transplantation:
    a. Review of MHC
    b. Transplantation
        - Descriptive terms
        - Graft rejection
        - Tissue matching
        - Types of tissues and organs transplanted
        - Prevention and treatment of rejections
        - Handson training in HLA typing

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Research methodology and biostatistics (60 Hours)

Introduction

a. Meaning of research, Objectives of research, Types of research, Significance of research, Research Process, Criteria of research

Defining research problem

a. Selection of the problem, Necessity of defining the problem, Techniques in selecting a problem, Examples.

Research Design

a. Meaning of design, Need for a research design, Different research designs, Basics of experimental designs, Developing research plan.

Sampling Design

a. Sample and Universe, Sampling, Different methods of sampling, Selection of a random sample, Census and survey.

Measurement and scaling techniques

a. Measurement in research, Measurement tools, Scaling and scaling techniques.

Data collection

a. Methods of data collection, Questionnaire/schedule, Selection of appropriate method for data collection, Guidelines for constructing questionnaire, Guidelines for interviewing, Sample questionnaires

Data Analysis

a. Introduction to data analysis, Demo with SPSS software.

Dissertation/Reporting (report writing)

a. Technique of interpretation, Report writing/Dissertation writing, Steps in report writing, How to critique an article.

Biostatistics

1. Statistics: What is statistics – Importance of statistics in behavioral sciences – Descriptive statistics and inferential statistics – Usefulness of quantification in behavioral sciences.
2. Measurements – Scales of measurements – Nominal, Ordinal, Interval and Ratio scales.
3. Data collection – Classification of data – Class intervals – Continuous and discrete measurements – Drawing frequency polygon – types of frequency polygon – Histogram – Cumulative frequency curve – Ogives – Drawing inference from graph.
4. Measures of central tendency – Need – types: Mean, Median, Mode – Working out these measures with illustrations.
5. Measures of variability – Need – Types: Range, Quartile deviation, Average deviation, Standard deviation, Variance – Interpretation.
6. Normal distribution – General properties of normal distribution – Theory of probability – illustration of normal distribution – area under the normal probability curve.

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7. Variants from the normal distribution – skewness – Quantitative measurement of skewness – kurtosis – measurement of kurtosis – factors contributing for non-normal distribution.
8. Correlation – historical contribution – meaning of correlation – types: - Rank correlation, Regression analysis.
9. Tests of significance- need for – significance of the mean – sampling error- significance of differences between means – interpretation of probability levels – small samples – large samples - Inferential statistics – Parametric & Non parametric methods – Elements of multivariate analysis

Biophysics and biomedical instrumentation (30 Hours)

Part A- Biophysics

1. Properties of matter
2. Membranes
3. Cells, structure of cells, structure of membranes, membrane transport processes, electrical properties of membranes - Structure & Properties of Ion Channels Voltage, Patch Clamp Tech –Synaptic Transmission- NMJ – Signal Transduction – Signaling – Second Messenger – Neural Network–Ion Channels in Brain Pathology.
4. Biophysics of nerve transmission
5. Membrane potential and its origin, membrane conductance, resistance and capacitance, action potentials, ionic basis of resting membrane potential and action potentials, synaptic transmission, electrophysiological basis for E.E.G., E.C.G & E.M.G recordings, evoked potential sand conduction velocity
6. Biophysics of the cardiovascular system
7. Basic principles of fluid dynamics, hemodynamics, introduction to principles of electrocardiography & vector cardiography
8. Biophysics of respiration
9. Mechanics of breathing, lung compliance, airway resistance and their measurement, surface tension& surfactants, partial pressure of gases, principles of gas exchange, measurement of blood gases, pulmonary function tests.
10. Biophysics of renal function
11. Diffusion, filtration, physical basis for ion, solute and water movement, dialysis, renal function tests.
12. Radiation biophysics
13. Introduction to nuclear physics and radioactivity, biological effects of radiation, radiation detection and measurement, radioisotopes and their uses.
14. Biophysical techniques
15. Introduction to microscopic techniques, introduction to spectroscopic techniques, introduction to imaging techniques, introduction to techniques in biophysical chemistry.

Part B- Biomedical instrumentation

1. Introduction to Biomedical Instrumentation
    a. The Age of Biomedical Engineering
    b. Development of BM instrumentation
    c. Biometrics
    d. Introduction to the man-instrument system
    e. Components of the man-instrument system
    f. Physiological systems of the body
    g. Problems encountered in measuring a living system.
    h. Some conclusions
    i. The objectives of this book
2. Basic Transducer principles:
    a. The transducer and transduction principles
    b. Active transducers
    c. Passive transducers
    d. Transducers for Biomedical applications
3. Sources of Bioelectric potentials:
    a. Resting and action potentials
    b. Propagation of Action potentials
    c. The Bioelectric potentials
4. Electrodes
    a. Electrode theory
    b. Biopotential electrodes
    c. Biochemical transducers
5. The computer in Biomedical Instrumentation:
    a. The digital computer
    b. Computer Hardware
    c. Computer software

Microprocessors

a. Types of microprocessors
b. Microprocessors in Biomedical Instrumentation
    - Calibration
    - Table lookup
    - Averaging
    - Formatting and printout

Interfacing the computer and medical instrumentation and other equipment.

a. Digital interfacing requirement
b. Analog-to-digital and Digital-to-Analog conversion

Biomedical computer application

a. Data acquisition.
b. Storage and retrieval
c. Data reduction and transformation
d. Mathematical operation

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e. Pattern recognition
f. Limit detection
g. Statistical analysis of data
h. Data presentation
i. Control function
   - Computer analysis of the ECG
   - The digital computer in the clinical chemistry laboratory.
   - Digital computerized in hemodialysis machine
   - Other computer application

6. Electrical safety of Medical Equipment.
   a. Physiological effects of electrical current.
   b. Shock hazards from electrical equipment.
   c. Methods of accident prevention
      - Grounding
      - Double insulation
      - Protection by low voltage
      - Ground – fault circuit interrupter
      - Isolation of patient – connected parts
      - Isolated power distribution systems
7. Patient care and monitoring:
   a. The elements of intensive – care monitoring - Patient monitoring displays
   b. Diagnosis, calibration and repairability of patient – monitoring equipment
   c. Other instrumentation for monitoring patients
   d. The organization of the hospital for patient care monitoring
   e. Defibrillator

Table of Contents

1. Description of Machine Functions and Malfunction
   a. Description of the T1Test
   b. Function description of the modules
   c. Function description of the hydraulic unit
2. Technical safety checks and maintenance
   a. General notes
   b. Technical safety checks and maintenance procedures
   c. VDE test 4008E, 4008H
   d. VDE test 4008B,4008S
   e. TSC and maintenance checklist
3. Adjustment
   a. OVERVIEW of the Dip switches in the 4008E
   b. Calibration mode
   c. Hydraulics
   d. Dir detector

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4. Calibration Program

5. Diagnostics Program
   a. General notes
   b. Menu structure
   c. Reading the analog inputs of CPU
   d. Reading the digital inputs of CPU
   e. Writing the analog outputs of CPU
   f. Writing the digital outputs of CPU
   g. Writing/ Reading the digital output of CPU
6. Setup Menu
   a. Overview
   b. Main menu
7. Miscellaneous
8. Circuit diagram and circuit description
   a. Block diagram
   b. Ac diagram 4008E/H
   c. AC diagram 4008B/S
   d. Block diagram of voltage supply Block diagram of screen 4008H/S
   e. Connection layout diagram
9. P.C.B. LP
10. BASICS
    1. Basics in Electricity
       - Charge
       - AC & DC
       - Voltage, Current, Resistance, Capacitance & Inductance
       - Electrical Shock hazard including Leakage currents
       - Voltage stabilizer and Uninterrupted power supply
    2. Basics in Electronics
       - Semiconductions
       - Rectification, Amplification, Oscillation & switching
       - Digital Electronics
       - Microprocessor & micro controllers
       - Memory [RAM, ROM, EPROM]
    3. Operating microscopy, Lab microscopy, Electron microscope
    4. General instrumentation for OT

Biomedical instrumentation Practical (30 Hours)

1. AC, DC
2. Measurement of Resistance, capacitance, Inductance
3. Measurement of Leakage of current
4. Amplification, Solid state, Digital
5. Trouble shooting equipment failure

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Basic course in entrepreneurship (45 Hours) (Elective Course)

LEARNING OBJECTIVES:

- To understand the fit between you and your entrepreneurial ambitions
- To find a problem worth solving
- To identify your customers
- To develop a solution for your customers' problems and problem solution
- To build and demonstrate an MVP
- To structure a business model around the problem, customer, and solution and present your Business Model Canvas

1. ORIENTATION
   What is entrepreneurship – myths about entrepreneurship – impact of an entrepreneur and social entrepreneurship – wealth building and making an impact
   IDEA/PROBLEM
   What is a business opportunity and how to identify it - Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) - Introduction to Design Thinking - Process and Examples - Generate ideas that are potential solutions to the problem identified
2. CUSTOMER
   The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns - Identify the innovators and early adopters for start-up - Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)
3. BUSINESS MODEL AND VALIDATION
   Introduction to Risks; Identify and document your assumptions (Hypotheses); Identify the riskiest parts of Plan - Develop the Solution Demo - Sizing the Opportunity - Building an MVP (Minimum Viable Product)
4. MONEY AND TEAM
   Revenue Streams: Basics of how companies make money - Understand income, costs, gross and net margins - Identify primary and secondary revenue streams - Pricing and Costs - Financing Your New Venture - Team Building: Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit; Defining clear roles and responsibilities
5. MARKETING AND SALES
   Positioning – channels and strategy – sales planning – Importance of project management to launch and track progress - Understanding time management, workflow, and delegation of tasks– Business regulation: Basics of business regulations of starting and operating a business - Importance of being compliant and keeping proper documentation.

BASICS OF HOSPITAL MANAGEMENT (45 Hours) (Elective Course)

1. Introduction to hospitals, functions, and managerial aspects of Hospitals

   Evolution of hospitals and the concept of modern hospital

   a. Explain how hospitals originated and transformed itself throughout history.
   b. What is the role of hospitals in healthcare
   c. Explain health delivery system in India
   d. Explain the types of hospitals and how modern hospitals are planned

2. General functions of hospital store management

   Material management and Inventory control

   a. Define basic concepts of material management.
   b. List the functions of hospital stores
   c. Explain the types of indents during the procurement process
   d. Explain various inventory management techniques

3. Analysis of Hospital Organization

   1. Administration of Clinical and nonclinical services

      a. Explain OPD and Inpatient services
      b. Interpret on hospital pharmacy services
      c. Explain Emergency Services
      d. Outline the services of Transport department in the hospital
      e. Explain Intensive Care Unit (ICU)
      f. Outlines the services of Operation Theater in the hospital
      g. Explain the various Radiological Services in the hospital
      h. Explain the Dialysis services in a hospital
      i. Explain biomedical waste management in hospital
      j. Explain the functions of CSSD & Medical gas supply
      k. What are the various Committees in hospital
      l. Outline the services of blood bank in a hospital
      m. Explain the Disaster management in a hospital

4. Public relation and Laws in Hospital administration

   Public relation and Laws

   a. Explain different laws in hospital administration like, COPRA, PCPNDT ACT, POCSO ACT and RTI etc
   b. Explain the roles and responsibilities of public relations in hospital
   c. List out the various risk involved in patient care
   d. Explain the elements of disaster management
   e. Plan for a Mock drill during a disaster strike in a hospital

5. Managerial Economics

   Cost-benefit analysis, Cost effectiveness analysis, cost utility analysis

   a. Explain cost analysis
   b. Explain cost effectiveness
   c. Explain cost utility

   Break even analysis

   a. Break even analysis of CT scan
   b. Break even analysis of dialysis machine

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6. NABH Accreditation

   a. Explain NABH accreditation as quality management

7. Strategic Management Tools

   a. Explain strategic management tools

8. Staffing Principles

   a. Explain Staffing

Renal Pathology Practical's (30 Hours)

1. Gross appearance, Histology of Kidney, outline and functions of kidney congenital anomalies and acquired cystic diseases
2. pathogenesis of Glomerular diseases. Immune mechanism- Types
3. Clinical manifestation of glomerulonephritis
4. Glomerular lesions in systemic disease
5. Pyelonephritis and urinary tract infection
6. Drug and toxin induced nephropathy
7. Benign and malignant nephrosclerosis
8. Urolithiasis
9. Obstructive uropathy.
10. Acute renal failure
11. Chronic renal failure
12. Tumors of the kidney and urinary bladder
13. Urine analysis
14. Peripheral blood smear

Pharmacology Practical's (30 Hours)

1. Administration of Erythropoiesis stimulating agents (ESA)
2. IV Iron Preparation
3. Vitamin supplements
4. Crystalloids & Colloids
5. Inotropic drugs
6. Anti-pyretic drugs
7. Anti-emetic drugs
8. Heparin, LMWH and Tri-sodium citrate, Regional Anticoagulation
9. Chemicals used in dialysis unit
10. PD fluids
11. Dialysis & CRRT solutions
12. Emergency Drugs used in Dialysis

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Nephro-immunology Practical's (30 Hours)

Nature of the Immune system
1. serological testing
2. Immunity and immunization
3. The lymphoid system:
4. Laboratory identification of lymphocytes
   - Fluorescence Microscopy
   - Cell flow cytometry
   - Other methods

5. Genes coding for the HLA antigens
6. Laboratory determination of T lymphocyte function
7. Laboratory detection of complement abnormalities
8. Handson training in HLA typing

Residency –II (135 Hours)

In the residency the professional is expected to work and contribute to the Dialysis Therapy unit.

Areas to be Covered.

1. Blood Bank
2. PHC, CHC
3. OPD
4. Transplant Work Up
5. Emergency Medicine
6. Radiology
7. Psychiatric
8. Operation Theater for assisting in AVF, AVG Creation, Renal Transplantation and PD Catheterization

Third Semester

Renal Disease (60 Hours)

1. Patient Assessment
   a. Physical Diagnosis
   b. Urinalysis/ BUN, Creatinine
   c. Measurement of Glomerular Filtration Rate
   d. Measurement of Urinary Protein
   e. Renal Imaging Techniques
   f. Renal Biopsy
   g. Indications for Dialysis
   h. Drug Therapy in Renal Disease
2. Clinical Syndromes
   a. Acute Glomerulonephritis/Acute interstitial nephritis
   b. Nephrotic syndrome
   c. Etiology, Pathophysiology, and Diagnosis of Acute Renal Failure
   d. Management of Acute Renal Failure

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e. Obstructive Uropathy
f. Asymptomatic Proteinuria
g. Asymptomatic Hematuria
h. Rapidly Progressive Glomerulonephritis
i. Nephrolithiasis
j. Urinary Tract Infection
k. Disorders of Tubular Function

3. Primary Glomerular Disease
   a. Minimal Change Disease
   b. Focal Segmental Glomerulosclerosis
   c. Membranous glomerulopathy
   d. IgA Nephropathy
   e. Membranoproliferative Glomerulonephritis
4. Secondary Glomerulonephritis
   a. Diabetic Nephropathy
   b. Lupus nephritis
   c. Post infectious glomerulonephritis
   d. Hepatitis-Associated Glomerulonephritis
   e. HIV-Associated Renal Disorders
5. Other parenchymal renal diseases
   a. Renal Dysplasia
   b. Cystic Diseases of the Kidneys
   c. Other hereditary renal diseases
   d. Reflux Nephropathy
   e. Renal Vasculitis
   f. Other Vascular Renal Disorders
   g. Sickle Cell Nephropathy
   h. Renal Disease due to dysproteinemias
6. Renal Diseases in Pregnancy
   a. Hypertension-Essential
   b. PIH/Eclampsia
   c. HELLP Syndrome
   d. ARF in pregnancy
   e. Lupus in Pregnancy
   f. Postpartum HUS
7. Toxic Nephropathy
   a. Drugs: Aminoglycosides/NSAIDS/Antineoplastic drugs
   b. Radiocontrast
   c. Heavy metals- Lead, Mercury, Cadmium.
   d. Alternative medicine
   e. Snakebite–venom
   f. Drug overdose- Barbiturates, Diazepam, Beta Blockers
8. Tropical Diseases related to Kidney
   a. Malaria
   b. Filariasis
   c. HANSENS Diseases
   d. Leptospirosis
   e. Dengue
   f. Leishmaniasis

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9. Geriatric Kidney Diseases
    a. Aged kidney
    b. Hypertension
    c. Atherosclerotic Kidney Diseases
10. Chronic Kidney Diseases
    a. KIDOQI Guidelines of definition, grading and management
    b. Epidemiology and outcomes of End-Stage Renal Diseases
    c. Uremic toxins
    d. Pathophysiology of Chronic Kidney Diseases
    e. Renal Osteodystrophy
    f. Renal Anemia
    g. Other manifestations of Uremia
    h. Malnutrition
    i. Risk factors– (Traditional and non-traditional) For Cardiovascular mortality in ESRD patients
11. Hypertension
    a. Essential Hypertension
    b. Renal parenchymal hypertension
    c. Renovascular Hypertension
    d. Pheochromocytoma
    e. Other Causes of Secondary Hypertension
    f. Hypertensive Emergencies
    g. Childhood Hypertension
12. Acid-Base and Electrolyte Disorders
    a. Metabolic Acidosis
    b. Metabolic Alkalosis
    c. Respiratory Acidosis
    d. Respiratory Alkalosis
    e. Hyponatremia and Hypernatremia
    f. Hypokalemia and Hyperkalemia
    g. Hypocalcemia and Hypercalcemia
    h. Phosphorus
    i. Magnesium
13. Approach to Patient with Renal Failure
    Manifestations of renal failure:
    a. Systemic consequence of renal failure Alterations in following including signs, symptoms etiology &management.
    b. Uremia
    c. Fluid balance
    d. Electrolyte and ion balance (sodium, potassium, calcium, phosphate, Magnesium, hydrogen, bicarbonate, aluminum)
    e. Cardiovascular system (Hyperkalemia, Hypertension, Pericarditis, Pericardial effusion, Pericardial tamponade)
    f. Respiratory system
    g. Gastrointestinal system
    h. Hematological system (Anemia, Platelet dysfunction)
    i. Endocrine function
    j. Neuromuscular function & sleep problems
    k. Skeletal system
    l. Psycho-social function
    m. Dermatological manifestations

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14. End-Stage Renal Disease Management
    a. Technical Aspects of Hemodialysis
    b. Hemodialysis: Assessing Adequacy
    c. Complications of Hemodialysis
    d. Technical Aspects of Peritoneal Dialysis
    e. Complications of Peritoneal Dialysis
15. Contraindications for Dialysis (Including PD)
    a. Alzheimer's Disease
    b. Multi-infract denaturation.
    c. Hepatorenal syndrome
    d. Advanced cirrhosis with encephalopathy
    e. Advanced malignancy etc.

Emergency medicine, ACLS and Renal Nutrition & Dietetics (45 Hours)

BLS

A. BLS in perspective
    a. The need for medical interventions
    b. The ultimate Coronary Care Unit
    c. Emergency Cardiac Care
    d. The chain of Survival
    e. Role of the American Heart Association
2. Cardio Pulmonary Function and actions for survival
    a. The Cardiovascular and Respiratory system
    b. Action for survival
3. Risk factors and prudent Heart living
    a. Risk factors for Heart Attack
    b. Prudent Heart Living
    c. Summary: The role of Prevention
4. Adult BLS
    a. Citizen response to Cardio-pulmonary Emergency
    b. Indication for BLS
    c. The sequence of BLS; Assessment, EMS activations and the ABC of CPR
    d. CPR performed by one rescuer and two rescuers
    e. Foreign – Body airway obstruction Management
    f. CPR: The Human Dimension
    g. BLS Research Initiative
5. Special Resuscitation Situation
    b. Stroke
    c. Hypothermia
    d. Near – Drowning
    e. Cardiac arrest associated with Trauma
    f. Electric shock and lightning stroke
    g. Pregnancy
    h. Asphyxiation
    i. Special techniques and pitfalls and complication
    j. Unique situation
6. Pediatric BLS
    b. Epidemiology
    c. Injury prevention
    d. Prehospital care

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e. The sequence of Pediatric BLS - the ABC of CPR
f. Activation of the EMS system obstructive
g. Foreign Body airway
h. BLS in Trauma

7. Ethical and Legal considerations
   a. Values in Decision Making
   b. Instituting and Discontinuing CPR
   c. Legal mandates
   d. Conclusions
8. Safety during CPR Training and actual rescue
   a. Disease transmission during CPR Training
   b. Disease transmission during actual performance of CPR
9. Automated External Defibrillation
   b. Importance of Automated External Defibrillation
   c. Overview of Automated External Defibrillation
   d. Advantage and Disadvantage of Automated External Defibrillation
   e. Use of Automated External Defibrillation during Resuscitation attempts
   f. Automated External Defibrillation treatment algorithm
   g. Post resuscitation care
   h. Training
   i. Maintenance of Skills
   j. Medical control
   k. Quality assurance

ACLS

1. Cardiopulmonary Resuscitation and Advanced Cardiac Life Support
   a. Basic Life Support
   b. General Considerations of Advanced Cardiac Life Support: Arrhythmia recognition and defibrillation-ventilation and airway management-route of drug administration-IV fluids-diagnose and correct the underlying cause of the arrest-internal cardiac compression-initiation and discontinuation of resuscitation.
   c. Specific Arrest Sequences in Advanced Cardiac Life Support: VF and Pulseless VT - Systole-Bradycardia-Pulseless electrical activity (PEA)-Tachycardias
   d. Post resuscitation Management
   e. Common Medications Used in Advanced Cardiac Life Support: Epinephrine-Atropine Sulfate-Lidocaine-Procainamide hydrochloride- Bretylium tosylate-magnesium sulfate-adenosine-Diltiazem or verapamil-Isoproterenol-Sodium Bicarbonate-Calcium
2. Critical Care
   a. Respiratory Failure: General considerations-pathophysiology-Blood gas analysis
   b. Oxygen therapy: Nasal prongs-venturi masks-Nonrebreathing masks-A continuous positive airway pressure mask-Bilevel positive airway pressure
   c. Airway Management and Tracheal Intubation: Airway Management-Endotracheal Intubation-Surgical airways
   d. Mechanical Ventilation: Indications-Initiation of mechanical ventilation-Management of problems and complications-Weaning from mechanical ventilation-Drugs commonly used during endotracheal intubation and mechanical ventilation
   e. Shock: Resuscitative Principles-Individual shock states

f. Hemodynamic Monitoring and Pulmonary Artery Catheterization: Indications-obtaining a pulmonary capillary wedge tracing-acceptance of PAOP readings-transmural pressure-Cardiac Output-Interpretation of hemodynamic readings

3. Cardiac Arrhythmias
   a. Recognition and Management: Clinical diagnosis of arrhythmias-Electrocardiographic data-Bradyarrhythmia's-premature complexes-Tachycardia-
   b. Antiarrhythmic Drug Therapy: General Principles-Antiarrhythmic agents
   c. Related Topics: Syncope-Electro-Cardioversion-Cardiac Pacing-Anti-tachycardia devices

Renal Nutrition and Dietetics

Part I: Foods and food groups

Cereals, Pulses, Fruits and Vegetables, Milk and Milk Products, Nits and oils seeds, non-Vegetarian foods, Beverages, Alcohol

Part II: Energy and nutrients
Carbohydrates, Fats, Proteins, Fat Soluble Vitamins, Water Soluble Vitamins, Minerals (Na, K, Fe, Ca, P, Mg, Mn, I, Cu, Co, Chloride, Fluoride) Dietary Fiber and Water.

Part III: Nutrition Management
1. NUTRITION THROUGH LIFE CYCLE
   Pregnancy and lactation, Pediatrics, Geriatrics, Athletes.
2. CLINICAL DIETETICS Hospital diets
   Nutritional management for the following:
   Under Nutrition (PEM), Over nutrition, Anemia, GI disorders, Hepatic, Renal, Cardiac/ HTN, Diabetes mellitus, Gout, Enteral Nutrition, Parenteral Nutrition.

Part IV: Nutritional Assessment
1. Anthropometry
   a. Methods, Interpretation, Limitation
   b. Growth and Body Composition (Fat mass and Free fat mass)
2. Biochemical Markers of Nutritional Status
   a. Physical Examination
   b. Medical History
3. Evaluation of Nutrient intake data
   a. Table of RDA
   b. Evaluation of Nutrient intake of individual
   c. Evaluation of Nutrient intake for a Population Introduction
4. Introduction
   a. Nutritional assessment system
   b. Methods used in nutritional assessment
   c. The design of nutritional assessment system
   d. Evaluation of nutritional assessment indices
      i. Reference distribution
      ii. Reference limits
      iii. Cutoff points
5. Food consumption of Individual
   a. Methods
   b. New development in measuring food consumption

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c. Selecting an appropriate method
d. Summary

6. Evaluation of nutrient intake data
   a. Tables of recommended nutrient intakes
   b. Evaluating Nutrient intakes of individuals
   c. Evaluating the nutrient intakes of population groups
   d. Probability approach to evaluating nutrient intakes
7. Anthropometric assessment
   a. Advantages and limitations of anthropometric assessment
   b. Sources of error in nutritional anthropometry
   c. Evaluation of anthropometric indices
8. Anthropometric assessment of growth
   a. Growth measurement
   b. Indices derived from growth measurements
9. Anthropometric assessment of body composition
   a. Assessment of body fat
   b. Assessment of fat-free mass
10. Clinical assessment
    a. Medical history
    b. Physical examination
11. Nutritional assessment of hospital patients
    a. Methods based on single indices
    b. Prognostic nutritional indices
    c. Hospital prognostic indices
    d. Cluster analysis
    e. Subjective global assessment the prognostic value of nutritional assessment indicesFood consumption of Individual
    f. Medical history
    g. Physical examination
12. Nutritional assessment of hospital patients
    a. Methods based on single indices
    b. Prognostic nutritional indices
    c. Hospital prognostic indices
    d. Cluster analysis
    e. Subjective global assessment the prognostic value of nutritional assessment indices

Nephro-Radiological and imaging sciences (30 Hours)

1. X-ray & Contrast Studies related to renal studies:

2. UROGRAPHY:Urographiccontrastmedia–choice–structure–contrastselection–contrastreaction rate of administered contrast material – methodology of intravenous urography – indications – contraindications – interpretation.

3. ULTRASOUND: Elementary ultrasound methodology–sonographic imaging characteristics –Doppler ultrasound – scanning techniques – ultrasound of the normal kidney – acute renal failure –surgical – medical renal disease – renal masses – cysts- solid renal masses – calculi – intra renal hematomas – renal transplant evaluation – rejection – renal infections – ultrasound versus intravenous contrast studies – percutaneous vs. guided ultra ventions – Doppler ultrasound in evaluation of renal vascular disease – evaluation of anatomic abnormalities.

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4. RADIONUCLIDE RENOGRAPHY: Methodology – selection of radionuclide – the gamma camera –indications – limitations – quantifications of renal function – GFR – effective renal plasma flow –obstructiveuropathy–vesicoureteralreflux–renaltransplantation–acuterenalfailure–Renovascular HT–captopnl renography– static renal imaging.

5. COMPUTED TOMOGRAPHY OF THE KIDNEY: Anatomy – technique – renal masses – cystic masses – solid renal masses – tumors of the renal pelvis – renal calculi – obstructive uropathy –infarction–acute renal cortical necrosis–renal vein thrombosis–renal artery stenosis–acute pyelonephritis – renal and perinephric abscess – emphysematous pyelonephritis – pylonephrosis –xanthogranulomatouspyelonephritis–tuberculouspyelonephritis–congenitalanomalies–renaltrauma–transplant kidneys

6. MAGNETIC RESONANCE IMAGING: technical aspects – magnetic resonance with IV contrast –normalkidney–congenitalanomalies–obstruction–injection–renalparenchymaldisease–hypertension and renal vascular disease – renal cysts – benign neoplasm's – malignancies of kidney –transplantation – magnetic resonance spectroscopy.

7. RENAL ANGIOGRAPHY: Indications– relative contraindications – patient preparation – basic procedure – specific techniques – abdominal aortography – selective renal arteriography – inferiorvenocavagraphy–selectiverenalvenography–renalveinrenninsampling–intraarterial–digital

8. Subtractionangiography–IV digital subtraction angiography–Complications–out patient arteriography– Angioplasty– renal artery stunts– transcatheter embolization.

9. RENAL BIOPSY: techniques of percutaneous renal biopsy – choice of needle – biopsy technique –trans jugular renal biopsy – open renal biopsy – contraindication – complication – processing of the biopsy specimen– malignancy of specimen interpretation.

10. NUCLEAR MEDICINE
    a. Basic of nuclear medicine.
    b. DTPA, DMSA.
    c. Peritoneal scintigraphy.
    d. Reflux scintigraphy.
    e. Transplant renal scintigraphy

Renal Disease Practical (30 Hours)

1. Patient Assessment
2. Clinical Syndromes
3. Primary Glomerular Disease
4. Secondary Glomerulonephritis
5. Other parenchymal renal diseases
6. Renal Diseases in Pregnancy
7. Toxic Nephropathy
8. Tropical Diseases related to Kidney
9. Geriatric Kidney Diseases

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10. Chronic Kidney Diseases
11. Hypertension
12. Acid-Base and Electrolyte Disorders
13. Approach to Patient with Renal Failure
14. End-Stage Renal Disease Management
15. Contraindications for Dialysis

Emergency Medicine and Renal Nutrition & Dietetics Practical's (30 Hours)

1. Adult BLS
2. Special Resuscitation Situation
3. Pediatric BLS
4. Automated External Defibrillation
5. Advanced Cardiac Life Support
6. Post resuscitation Management
7. Critical Care
8. Cardiac Arrhythmias
9. Nutrition Management
10. Nutritional Assessment

Nephro- Radiology and Imaging sciences Practical's (30 Hours)

1. X-ray & Contrast Studies related to renal
2. UROGRAPHY
3. ULTRASOUND
4. RADIONUCLIDE RENOGRAPHY
5. COMPUTED TOMOGRAPHY OF THE KIDNEY
6. MAGNETIC RESONANCE IMAGING
7. RENAL ANGIOGRAPHY
8. Subtractionangiography
9. RENAL BIOPSY
10. Peritoneal scintigraphy
11. Reflux scintigraphy.
12. Transplant renal scintigraphy

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Residency part – III (225 Hours)

In the residency the professional is expected to work and contribute in the Nephrology OPD, Nephrology Ward, ICUs & Dialysis Therapy unit.

Fourth Semester

Advanced Renal Replacement Therapy (60 Hours)

1. Hemodialysis
    a. Vascular Access:
        i. History
        ii. Epidemiology
        iii. Arteriovenous Grafts
        iv. Arteriovenous Fistula
        v. Vascular Access Monitoring and surveillance
        vi. Cuffed Venous Catheters
        vii. Treatment of Vascular Access Dysfunction
        viii. Pharmacologic Prevention of Vascular Access Failure
    b. Artificial Physiology:
        i. General Principles of Hemodialysis
            1. Clearance
            2. Hemodialysis Membranes: Effects and Characteristics
        ii. Components of the Extracorporeal Circuit
            1. Blood circuit
            2. Dialysate Circuit
            3. Variations in the Extracorporeal Circuit
            4. On-line monitoring
            5. Dialysate Composition
            6. Water used in Hemodialysis
        iii. The Dialysis Prescription
            1. Dialyzer choice
            2. Anticoagulation for Hemodialysis
            3. Blood and Dialysate Flow
            4. Dialysis Time
            5. Dialysate composition
            6. Dialysate Temperature
            7. Ultrafiltration Rate
        iv. Hemodialysis Adequacy
            1. Historical Perspective
            2. Low-Molecular-Weight Substances and Middle Molecules
            3. The national cooperative dialysis study
            4. Effect of Dialysis with High-Efficiency and High-Flux Dialysis
            5. The Hemo Study
        v. Alternative Chronic Hemodialysis Prescriptions
            1. Daily Dialysis and Outcome
            2. Nocturnal hemodialysis
            3. Short daily hemodialysis
            4. Outcome studies
        vi. Alternative approaches to quantification of Dialysis
            1. Urea reduction Ration and solute removal index
            2. Standard measure of the Dose of Dialysis: Kt/V
        vii. Management of the maintenance's hemodialysis patient
            1. Uremic syndrome
            2. Anemia
            3. Cardiovascular disease
            4. Vascular calcification

5. Calciphylaxis
6. Nutrition
7. Infection and immunity

viii. Complications of Hemodialysis
1. Hypotension
2. Cramps
3. Dialysis disequilibrium syndrome
4. Arrhythmias and angina
5. Hypoxia
6. Hypoglycemia
7. Hemorrhage
8. First-use syndrome or syndrome arrhythmias and angina
9. Problems with dialysate composition and integrity of the extracorporeal circuit

ix. Plasmapheresis
x. MARS
xi. The future of Renal Replacement Therapy

2. Peritoneal Dialysis
a. Components of the peritoneal dialysis system
i. Catheters
ii. Dialysis solutions
iii. Peritoneal membrane
b. Peritoneal Catheter Implantation
i. Surgical technique
ii. Bedside technique
c. Peritoneum as a dialysis system
i. Resistance to salt and water transport
ii. Models of peritoneal transport
iii. Physiology of peritoneal transport
d. Clinical observations of peritoneal membrane function
i. Characterization of peritoneal membrane transport
ii. Stability of the peritoneal membrane over time
iii. Conclusions
e. Clinical use of peritoneal Dialysis
i. Choice of Dialysis modality
ii. Peritoneal Dialysis Modalities
iii. Choice of peritoneal dialysis modality
f. Adequacy of peritoneal dialysis
i. When to initiate dialysis
ii. Measurement of the peritoneal dialysis dose
iii. Adequate dose of peritoneal dialysis
g. Writing the dialysis prescription
i. Initial prescription
ii. Adjustments to the initial dialysis prescription
iii. Further adjustments to the dialysis prescription
iv. Success in achieving adequate dialysis.

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h. Nutrition
    i. Malnutrition
    ii. Nutritional parameters
    iii. Nutrition guidelines
    iv. Interventions for malnutrition
i. Peritoneal dialysis in special populations
    i. Rapid transporters
    ii. Elderly patients
    iii. Patients with diabetes mellitus
    iv. Black and Hispanic patients'
    v. Pediatric patients
    vi. Patients infected with the human immunodeficiency Virus.
    vii. Pregnant patients
j. Peritoneal dialysis in a Nonchronic setting.
    i. Acute renal failure
    ii. Nonnumeric uses of peritoneal dialysis
k. Complications of peritoneal dialysis
    i. Cardiovascular disease
    ii. Comparison of hemodialysis and peritoneal dialysis
    iii. Indications for switching from peritoneal dialysis to hemodialysis.
    iv. Noninfectious complications
    v. Infections complications
l. Future trends in peritoneal dialysis
    i. Mini PET

3. Clinical considerations in the Evaluation of Dialysis Patients
    a. Hypertension in Dialysis Patients
    b. Left Ventricular Dysfunction in Dialysis Subjects
    c. Coronary Artery Disease in End-Stage Renal Disease
    d. Autonomic Function and hemodynamic stability in End- Stage Renal Disease Patients
    e. Infection and immunity in End-stage renal disease
    f. B2-Microglobulin- Associated Amyloidosis of End-Stage Renal Disease
    g. Renal Osteodystrophy
    h. Dyslipidemias of End-Stage Renal Disease
    i. Selection of Therapy for Patients with End-stage renal disease
    j. Malnutrition and Intradialytic Parenteral Nutrition in ESRD Subjects
    k. Disorders of Homeostasis in Dialysis Patients
    l. Treatment of Anemia in Dialysis Subjects
    m. Acquired Cystic Kidney Disease
    n. Geriatric Dialysis Patients
    o. Diabetic Dialysis Patients
    p. Hemodialysis and Hemoperfusion for poisoning
    q. Dialysis considerations in the patient with Acute Renal Failure
    r. Infections in patients on Continuous Ambulatory Peritoneal Dialysis
    s. Balancing outcomes in Dialysis with Economic Realities

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4. Pediatric Dialysis
   a. Pediatric HD

      Introduction, HD in ARF causes of ARF in children, Indication for Dialysis, principles of Dialysis in ARF, HD in acute poisonings, HD for inborn errors of metabolism, acute vascular assess.

      Chronic HD

      incidence and etiology of terminal renal failure in pediatric population, patient selection, facilities for treatment, indication for dialysis, technical aspects of pediatric HD, vascular access, AV fistula, bridge grafts, catheters, complication of vascular access, HD equipment

      Methods of Pediatric Dialysis: -

      Common problem associated with long term HD, preparation of a child for eventual kidney Transplantation.

   b. Pediatric PD

      Peritoneal dialysis kinetics in children, catheter placement, PD in ARF, APD for reasons others

      than ARF, PD in CRF, Intermittent PD, Continuous PD, CAPD, CCPD, PD in small infants, complication of PD, supplemental therapy, the future of PD in children, transplantation of patients on PD.

   c. Nutritional Management of Pediatric patients on chronic Dialysis:

      Introduction, Nutritional Assessment, Anthropometrics parameters, Biochemical assessment, Radiological assessment, Dietary recommendations, Energy requirements, protein require, Lipid require, sodium, Potassium, water, renal osteodystrophy, Vit D therapy, vitamins, Trace elements: Iron, Zinc and Copper, Nutritional considerations for the infant receiving CAPD or CCPD treatment.

   d. Psychosocial problems related to dialysis in pediatric patients:

      Introduction, Adjustment, compliance, neuropsychological development, rehabilitation.

   e. Pediatric CAV Hemofiltration:

      Pediatric operational principles of CAVH, characteristics of available hemofilters, practical operational details, clinical experience in the neonate, clinical experience in older children, conclusion.

   f. Preemptive Renal Transplantation in infancy: -

      Introduction, indications for renal replacement therapy in infancy, renal failure in infancy, growth in infants with renal failure, neurologic development in infants with renal failure, dialysis in infants, PD in infancy, complication of PD in infancy, immunologic effects of PD in the infant hemodialysis in infancy, Renal transplantation in infancy, preparation for infant transplant, post transplantation complication, immunosuppression protocols, identification and treatment of allograft rejection, growth post-transplant in the infant, cost and (RE) hospitalization in the infant with ESRD, Summary.

   g. Management of common Electrolyte Disorders in children.
   h. Clinical Care Coordinator: The Pediatric Nephrology Technologist of the Future.

5. Recent Advance in Dialysis and Nephrology
    a. Artificial Intelligence in Renal Sciences and Dialysis Technology
    b. Machine Learning Models
    c. Connected neural network
    d. Convolutional neural network (CNN)
    e. Recurrent neural network (RNN)
    f. Generative adversarial network (GAN), and deep reinforcement learning
6. Advanced HD procedures
    a. Nocturnal Dialysis
    b. Online dialysis
    c. Daily dialysis
    d. Telemedicine in Dialysis Practice
7. Calculators
    a. IV rate and dose
    b. Access recirculation
    c. URR
    d. Concentration
    e. GFR Adult/Pedi
    f. Kt/V (different formulas)
    g. Urea volume distribution
    h. Creatinine Clearance
    i. BMI
    j. Weight and measures (Length, volume, weight, Fahrenheit, Celsius etc)
8. Cyber Nephrology

Renal transplantation and coordination & psychology (60 Hours)

A. Renal transplantation and coordination

1. History of Transplantation
2. Characteristics of the allogenic immune response
3. Tolerance and immunity:
    a. Self – non-self-discrimination
    b. Antigen recognition
    c. Immune tolerance
4. Transplantation antigens:
    a. ABO, Monocyte and Endothelial cells Ag
    b. Major + Minor Histocompatibility Ag
5. Major Histocompatibility Complex
    a. HLA GI and HLA GII
    b. Nature of Allorecognition
    c. Inheritance of HLA.
6. Tissue typing:
    a. HLA typing, short term vs long term/ quality of typing
    b. Matching for split Ags, relative strengths of HLS cocci
    c. Effects of blood transfusion
7. Regulation of the Immune response –
    a. Role of Ag prescribing cell.
    b. T Cell receptor recognition of Ag

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c. CD4/CD8 cells subsets
d. Accessory molecules
e. T Cell activation
f. T Cell energy
g. Lymphokines and lymphokine receptors
h. Th1 + Th2 cell subsets

8. Graft rejection
   a. Hyperacute / acute/ accelerated/chronic
   b. Mechanisms – Ab mediated/T cell mediated/ Delayed Type/ hypersensitivity – mediated NK cell mediated.
9. Mechanisms of Immunosuppression – Corticosteroids/ Azathioprine/FK506/ Rapamycin/Polyclonal immune Globulins/MAb
10. Donor specific immune tolerance/ Tolerance induction by blockade of co stimulation
11. Evaluation of the donor + recipient – special issued + consideration prior kidney Transplantation /Age/Diabetes mellitus/cardiovascular disease/ infections/Malignant neoplasms / metabolic bone disease GI disease/ pulmonary/ urologic evaluation/ systemic disease /psychiatric problems/ vascular disease.
12. Immunological evaluation of the Transplant recipient – typing + Ag matching
13. Screening of Humoral sensitization
14. Cross matching – techniques
15. ABO Blood group matching/ family testing to determine haplotypes/ Cellular assays for – HLA testing/ Analysis of survival data.
16. Kidney donation – live donation – non related / related donors, cadaver.
    a. Cadaver organ harvesting and preservation
    b. Kidney preservation – solutions
17. Transplant surgery + potential complications – Pre-OP care/Surgical technique, post OP management/ potential complications.
18. Immunosuppressive therapy – Induction protocols/ maintenance protocols.
    a. AZA/ Steroids/ CSA – Pharmacology – drug interactions
19. Antirejection therapy – Pulse corticosteroids / ALS / OKT3
20. Clinical Approach to Allograft dysfunction – ATN/ CSA/hyperacute rejection
    a. Acc or Acute rejection / other causes of DGF/ late chronic dysfunction.
21. Pathological diagnosis of Allograft dysfunction
22. Recurrent Glomerulonephritis
23. Denovo injury
24. Medical complications – Infections disease – Time table – viral infections – CMV/EBV
    a. Bacterial Infection– UTI – Opp. Bact. Infections/ Fungal Infection
    b. Cardiovascular disease – HT
    c. Lipid disorders
    d. Liver disease – HBV/HCV
    e. Malignancy
    f. M,
    g. Diabetes Mellitus, hematological problems
25. Pancreatic – Kidney transplantation
26. Pediatric transplantation – problems.

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B. Psychology

1. Psychiatric Assessment
    a. Introduction to clinical assessment
    b. The Psychiatric interview
    c. The mental status Exam
    d. Physical Exam and laboratory evaluation
    e. Intelligence testing and neuropsychological assessment
    f. Personality assessment
2. Psychiatric Aspects of Renal Care
    a. Introduction
    b. Psychiatric problems: uncooperativeness-cause of uncooperativeness
    c. Depression and Suicide, anxiety, rehabilitation problems, sexual problems
    d. Psychiatric fitness for Transplantation
    e. Treatment of psychiatric problems- preventive therapy-group therapies-environmental Manipulations-psychotherapy-pharmacotherapy-behavioral sexual techniques
3. Rehabilitation and Psychosocial Issues
    a. Endurance Exercise training in hemodialysis patients
    b. Psychosocial rehabilitation of Adult dialysis patients
    c. Ethical Dilemmas in Dialysis: To initiate or withdraw Therapy
4. Mental Disorders
    a. Diagnosis and classification in psychiatry
    b. Psychiatry history and examination
    c. Organic (Including Symptomatic) mental disorders
    d. Psychoactive substance uses disorders
    e. Schizophrenia
    f. Mood Disorders, Anxiety and personality
    g. Other psychotic Disorders
    h. Neurotic, stress-related and somatoform disorders
    i. Disorders of Adult personality and behavior
    j. Sexual disorders
    k. Sleep disorders
    l. Behavioral syndromes associated with psychological disturbances and physiological factors
    m. Mental retardation
    n. Child psychiatry
    o. Psychopharmacology
    p. Biological methods of treatment
    q. Psychoanalysis
    r. Psycho treatment
    s. Emergency psychiatry
    t. Legal and ethical issues in psychiatry
    u. Common psychiatry

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QUALITY ASSURANCE AND MANAGEMENT OF DIALYSIS UNIT (60 Hours)

Introduction

1. The Basics of Quality Assurance
    a. DEFINITION
    b. QUALITY ASSURANCE METHODS
    c. The JCAHO 10-Step Process for Monitoring and Evaluation
    d. Comprehensive Quality Assurance Program
    e. Quality Control
    f. Continuous Improvement Concepts
2. Water Treatment
    a. RISKS AND HAZARDS
    b. QUALITY ASSURANCE FOR WATER TREATMENT SYSTEMS
    c. Policies and Procedures.
    d. Staff Training and Education
    e. Monitoring and Evaluation.
    f. Daily Monitoring
    g. Monthly Monitoring
    h. Patient Monitoring
    i. Home Dialysis Monitoring
    j. Other Monitoring
    k. Prevention
3. Dialysis Delivery System
    a. Technical description of device
    b. Risks and hazard
    c. Quality assurance for dialysis delivery systems
    d. policies and procedures
    e. staff training and education
    f. monitoring and evaluation
        1. Daily monitoring's
        2. Monthly monitoring's
        3. Patient monitoring
        4. Home dialysis monitoring
        5. Other monitoring
        6. Prevention
4. Dialysate and Dialysate Concentrate
5. Hemodialyzers
6. Ancillary Devices and Equipment
7. Anticoagulation
8. Vascular Access Devices
9. Hemodialyzer Reuse
10. Infection Control
11. Handling of Toxic Chemicals
12. Basics of Management of health care organization include administrative aspects of dialysis unit

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13. Patient education & health patient with RRT
    - Patient Education
    - Communication
    - Patient communication problems
    - Explanation of examinations
    - Interacting with terminally ill patient
    - Informed Consent
    - Patient counseling on
        - Living with CKD
        - Life with HD and CAPD
        - Living with a transplanted kidney.
    - Evolution of Quality management
    - Quality assurance methods
    - Patient satisfaction
    - Standard operating procedure
    - Quality certification
    - Accreditation to national agencies

Advanced Renal Replacement Therapy Practical's (30 Hours)

Hemodialysis

1. Alternative Chronic Hemodialysis Prescriptions
    - Daily Dialysis and Outcome
    - Nocturnal hemodialysis
    - Short daily hemodialysis
    - Outcome studies
2. Alternative approaches to quantification of Dialysis
    - Urea reduction Ration and solute removal index
    - Standard measure of the Dose of Dialysis: Kt/V
3. Management of the maintenance's hemodialysis patient
    - Uremic syndrome
    - Anemia
    - Cardiovascular disease
    - Vascular calcification
    - Calciphylaxis
    - Nutrition
    - Infection and immunity
4. Plasmapheresis
5. MARS
6. The future of Renal Replacement Therapy

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7. Peritoneal Dialysis
    a. Peritoneal dialysis in special populations
        i. Rapid transporters
        ii. Elderly patients
        iii. Patients with diabetes mellitus
        iv. Black and Hispanic patients'
        v. Pediatric patients
        vi. Patients infected with the human immunodeficiency Virus.
        vii. Pregnant patients
    b. Peritoneal dialysis in a Nonchronic setting.
        i. Acute renal failure
        ii. Nonrenumeric uses of peritoneal dialysis
    c. Management of Complications of peritoneal dialysis
        i. Cardiovascular disease
        ii. Comparison of hemodialysis and peritoneal dialysis
        iii. Indications for switching from peritoneal dialysis to hemodialysis.
        iv. Noninfectious complications
        v. Infections complications
    d. Future trends in peritoneal dialysis
        i. Mini PET
8. Pediatric Dialysis
    - Pediatric HD
    - Pediatric PD
    - Nutritional Management of Pediatric patients on chronic Dialysis:
    - Pediatric CAV Hemofiltration:
    - Management of common Electrolyte Disorders in children.
    - Clinical Care Coordinator: The Pediatric Nephrology Technologist of the Future.
9. Recent Advance in Dialysis and Nephrology
    - Artificial Intelligence in Renal Sciences and Dialysis Technology
    - Machine Learning Models
    - Connected neural network
    - Convolutional neural network (CNN)
    - Recurrent neural network (RNN)
    - Generative adversarial network (GAN), and deep reinforcement learning
10. Advanced HD procedures
    - Nocturnal Dialysis
    - Online dialysis
    - Daily dialysis
    - Telemedicine in Dialysis Practice
11. Calculators
    - IV rate and dose
    - Access recirculation
    - URR
    - Concentration
    - GFR Adult/Pedi
    - Kt/V (different formulas)
    - Urea volume distribution

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- Creatinine Clearance
- BMI
- Weight and measures (Length, volume, weight, Fahrenheit, Celsius etc)

12. Cyber Nephrology

Renal transplantation and coordination & psychology Practical's (30 Hours)

1. Renal transplantation and coordination
2. Tissue typing:
3. Screening of Humoral sensitization
4. Cross matching
5. ABO Blood group matching/ family testing to determine haplotypes/ Cellular assays for HLA testing/ Analysis of survival data
6. Kidney donation – live donation – non related / related donors, cadaver
7. Clinical Approach to Allograft dysfunction
8. Psychiatric Assessment
9. Rehabilitation and Psychosocial Issues
10. Grief Counselling

Quality assurance and management of Dialysis unit Practical's (30 Hours)

1. QUALITY ASSURANCE METHODS
2. JCAHO 10-Step Process
3. Quality Control
4. QUALITY ASSURANCE FOR WATER TREATMENT SYSTEMS
5. Quality certification
6. Accreditation to national agencies

Residency part – IV (180 Hours)

In the residency the professional is expected to work and contribute in the Nephrology OPD, Nephrology Ward, ICUs & Dialysis Therapy unit.

Project / Thesis/ Dissertation (180 Hours)

Each candidate will have to carry out of a dissertation on the related subject. The dissertation will be guided by one or two members of the faculty of the department. The dissertation will be evaluated by the External/Internal Examiners. The final dissertation duly approved by the External/Internal examiners will be submitted to the Dean's office with the result. The dean's

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Competency

Professional conduct: *The Masters of Dialysis Therapy is specifically aimed at those pursuing a professional career in Dialysis Therapy. It is designed to provide specialized training both in basic scientific principles of modern Dialysis and in the application of these principles to the understanding of a wide variety of renal-uro disorders. It is designed as a higher degree program suitable for graduates having some experience in Dialysis Therapy. It is designed to provide training for a future career in research in basic and clinical renal science. The program aims to enhance the scientific skills of clinicians and to provide non-clinical graduates with an insight into clinical problems that will allow them to work alongside clinicians in clinical research projects.*

PERFORMANCE CRITERIA	INDICATOR			Measurement Criteria
	Knowledge	*Skill*	*Behaviour*	
1. Ability to understand the theory related to Dialysis therapy.	1. Basic knowledge of all the subjects including human Anatomy, Physiology, Dialysis Therapies, Recent Advances, Transplantation, Pharmacology, Pathology, Microbiology, Biochemistry, Ethics & Pedagogy, Applied DT etc.	1. Should be able to present seminars and demonstrate facilitation of adult teaching, & tutorials related to the syllabus. 2. Should be able to educate UG-level students.	1. Should be able to behave well with the teachers and students. 2. Should be soft-spoken. 3. Demonstrate good communication & comprehensive proficiency.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4. Pedagogy 5.Seminar presentation 6.Case presentation 7.Self-assessment & Peer-assessment 8.Viva voce 9.Patient simulation 10.Student projects 11.Problem & Cases Based Learning
2.Ability to understand the roles and responsibilities of a Dialysis therapist	1. In-depth Knowledge of the principles of dialysis.	1. Demonstrate an ideal supervisory/ managerial ability to guide & lead the dialysis team.	1. Have a good working support with the dialysis team & the students.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE

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	2. In-depth knowledge of all the modalities as well as procedures of dialysis therapy treatment. 3. In-depth knowledge of all the complications, their preventive measures, management as well & treatment options. 4. Adequate knowledge of managerial responsibilities & roles of a clinical supervisor. 5. Adequate knowledge of logistics & inventory management of dialysis therapy.	2. Demonstrate inventory & logistical management. 3. Ability to decide on appropriate dialysis prescription. 4. Perform all the processes of initiating & terminating dialysis therapy. 5. Identify the complications during dialysis and provide instant management as well as bedside teaching of the same to the UG students, interns & other trainees.	2. Greet & respect patient & their attendants with care & appropriate manners. 3. Provide counselling to the patient as appropriate.	5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem-based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning
3. Ability to consider a patient's health as their utmost priority.	1. Understand & explain the physiological condition of a dialysis patient.	1. Identify the patient's needs & requirements based on their clinical presentation & lab workups.	1. Greet & respect patient & their attendants with care & appropriate manners.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE

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	2. Understand & explain the practice of medical sociology & psychology in dialysis therapy.	2. Explain Renal Replacement Therapy options & demonstrate patient education to help them make the optimum choice of therapy. 3. Plan the prescription of dialysis therapy. 4. Identify & plan a dynamic patient-tailored renal diet consultation & plan renal diet/nutrition.	2. Understand & empathize with a patient's psychological & social issues while constructively communicating with them. 3. Ensure equal care & treatment are given to all patients. 4. Respect patients regarding their care plan decisions.	5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem-based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning
4. Ability to perform different modalities of Dialysis.	1. Should have knowledge of all the extracorporeal therapies including-Haemodialysis, Peritoneal dialysis, Plasmapheresis, CRRT modalities, Hemoperfusion, SPAD, MARS etc.	1. Perform all the aspects of therapeutic & clinical practice pertaining to haemodialysis and peritoneal dialysis.	1. Demonstrate adaptability to different situations & environments at the workplace. 2. Demonstrate good working conduct under stressful situations.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation

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		2. Demonstrate efficient patient as well as their attendant/family education & counselling pertaining to HD & PD procedures, lifestyle changes, diet restrictions, vascular access care, etc. 3. Able to perform and demonstrate the priming of plasmapheresis to all the UG students. 4. Perform hemoperfusion and management of the complications during the treatment. 5. Can present or demonstrate all the therapies to the UG students and another trainee.		7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem-based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning

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5. Ability to independently deliver the best quality dialysis therapies with excellent clinical competency.	1. Comprehend & explain the principles of renal replacement therapies & each modality. 2. Comprehend & explain the principles & modalities of extracorporeal blood therapies. 3. Comprehend & explain the concept of renal transplantation & coordination (both pre & post transplantation). 4. Comprehend & explain the complications of dialysis therapies their management & treatment. 5. Understand & describe the concept of biomedical instrumentations/electronics used in dialysis therapies.	1. Independently demonstrate & perform haemodialysis, peritoneal dialysis, and extracorporeal blood therapies. 2. Perform dialysis therapies & extracorporeal blood therapies in critically ill patients in different types of ICUs- Surgical, Medical, Isolation, Cardio-thoracic, Paediatric, Neuro, Coronary Care ICU, etc. 3. Perform dialysis therapy & extracorporeal blood therapies for infectious patients- Covid-19, H1N1, Viro-positive, MRSAs, TB, etc.	1. Demonstrate good interpersonal relationships with the dialysis team. 2. Demonstrate critical thinking & conflict management. 3. Demonstrate leadership & navigation qualities at the workplace.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem-based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning

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	6. Understand & describe the basic nursing care in dialysis therapies to provide total patient care. 7. Understand & describe the concept of research methodology. 8. Emphasize & understand the recent advances in dialysis therapies & the utilization of AI in dialysis therapies.	4. Perform dialysis therapies & extracorporeal blood therapies in special cases- Paediatric, geriatric, autistic, pregnant women, differently abled patients, etc. 5. Independently demonstrate & perform AVF/AVG cannulation & Central Venous catheter handling. 6. Operate routine maintenance, identification of a malfunction, troubleshooting, and minor repair for all equipment used in dialysis units such as hemodialysis machines, water treatment plants, dialyzer reprocessing machines, etc.		

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		7. Identify & handle complications of dialysis therapies & extracorporeal therapies of each modality. 8. Demonstrate basic renal nursing care in dialysis patients- safe injection practices, blood & blood products transfusion, IV cannula insertion, IV antibiotic administrations, emergency medication administration during intradialytic complications, anticoagulant iv injections, EPO & iron injections, the concept of the crash cart, etc. 9. Demonstrate BLS & ACLS		

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		10. Development & planning of a dialysis unit for a standalone organization or a healthcare set-up. 11. Participate & assist in research activities		
6. Ability to follow quality assurance guidelines and healthcare policies.	1. Be able to comprehend and articulate hospital infection control policies, quality assurance and patient safety procedures, and fundamental management principles in the healthcare and dialysis industries.	1. Develop efficient SOPs for a dialysis therapy unit. 2. Understand & demonstrate the emergency codes protocols- Code Red, Code Blue, Code Yellow, Code Pink, Code Violet, etc. 3. Demonstrate hospital infection control practices.	1. Proactive attitude and awareness of potential health and safety hazards in the immediate area. 2. Pleasant support for the patients, facilitating access to the dialysis therapists and fostering patient satisfaction.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem-based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning

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7. Ability to administer medications under the supervision of a nephrologist.	1. Proper knowledge of the drugs used in the dialysis unit. 2. Knowledge of the administration of different drugs through different routes.	Should follow International Patient Safety Goals (IPSG 1to 6) 1. Identify patients correctly. 2. Improve effective communication. 3. Improve the safety of high alert medications. 4. Ensure safe surgery. 5. Reduce the risk of health care associated infections. 6. Reduce the risk of patient harm resulting from falls. 7. To provide medication through IV, IM, SC, and oral routes.	1. Demonstrate honesty & integrity while patient medication handling. 2. Demonstrate good communication with the patient party & the nephrologists/physicians. and other stakeholders 3. Counsel the patient party effectively regarding the medications & probable side effects	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer assessment 9.Problem-based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning

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		8. Ability to perform drug calculations for all administration routes, give legal pharmaceutic als in accordance with hospital policy, and, where necessary, take appropriate corrective action for complications while being supervised. 9. Demonstrate excellent documentatio n ability.		
8. Ability to supervise and educate UG/PG students	1. Comprehend & explain the dialysis therapies & all the modalities. 2. Comprehend & explain the basic knowledge of the prescription, complications, and treatment.	1. To function as a dialysis therapy faculty. 2. To function as a faculty in facilitating & training students, trainees, and interns with dialysis therapy modalities.	1. Polite and presentable . 2. Show good communic ation & comprehen sive proficiency. 3. Maintains good interperson al relations with the clinical team.	1.Class tests (debates, essay questions, MCQs etc.) 2.Summative assessment 3.Formative assessment 4. Pedagogy 5.Seminar presentation 6.Case presentation 7.Self-assessment & Peer-assessment

	3. Demonstrate & teach clinical competency & patient care.	3. Demonstrate & teach students using simulations/dummies for dialysis procedures and vascular access handling. 4. Efficiently perform university/college activities as per the requirements & protocols.	4. Observe professional conduct & integrity as dialysis therapy faculty.	8.Patient simulation 9.Student projects 10.Problem & Cases Based Learning
9. Ability to actively exhibit a good approach in the Research field.	1. Good knowledge of the recent trends and studies related to kidney disease patients and dialysis. 2. Good knowledge of the research methodology & statistical theory.	1. Should be able to observe all the protocols & policies of the Institutional Research Committee and Ethical Committee. 2. Should be able to propose & conduct any type of research projects, case reports, article reviews, etc. related to one's field/subject.	1. Demonstrate ethical conduct & confidentiality while handling patient data & information. 2. Respect the study participants' decisions & their involvement. 3. Acknowledge & credit all the members involved in the study.	1. Student projects 2.Summative assessment 3.Formative assessment 4.Case presentation 5. Problem & Cases Based Learning

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		3. Should be able to engage, guide/co-guide & facilitate all the staff and students to perform their research project. 4. Should be proficiently aware of global studies & latest trends in research. 5. Should be able to facilitate & assist the nephrologists, other healthcare professionals, or other research enthusiasts as & when approached for their studies as deemed.	4. Ability to be a team player. 5. Demonstrate critical thinking & thorough attention to detail. 6. Organizational and communications skills. 7. Motivated & enthusiastic about their work & it's completion on their own.	

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		6. Demonstrate effectively explaining the involvement of the study participants in detail & acquiring informed consent forms from them. 7. Demonstrate professional presentation of their study with good comprehensive proficiency.		

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5.4. Ph.D. Dialysis Therapy (Ph .D.)

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Ph.D. Dialysis Therapy (Ph.D. DT)

Purpose

Doctoral education is to prepare scholars who will contribute both to the development and application of knowledge in the field of dialysis for enhancing quality of education, research, practice and dissemination of knowledge.

Objectives

The Ph.D. in Dialysis Therapy will be able to

- Conduct original research aimed at expanding the understanding of renal replacement therapy, renal sciences and diseases related to kidneys.
- Contribute new knowledge to the field of renal sciences through rigorous investigation, experimentation, and analysis.
- Explore the application of scientific findings to diagnose, treat, and manage renal disorders and diseases.
- Innovate new methodologies, techniques, or therapies for improving renal health outcomes and patient care.
- Collaborate with experts from various disciplines to gain a comprehensive understanding of renal health and disease.
- Publish research findings in peer-reviewed journals and present at conferences to contribute to the broader scientific community and advance the field of nephrology.
- Acquire advanced skills in research methodology, data analysis, critical thinking, and scientific communication, preparing for careers in academia, research institutions, healthcare, or biotechnology

Research Guide/ Co Guide

- Guides can select any 10 scholars at any given period of time.
- Scholars can have co-guide from any disciplines if required.
- Ph.D. in Dialysis Therapy (Desirable)
- In view of very limited no of Doctorates available in Dialysis Therapy. The Ph.D. Doctorate within Allied and health care disciplines/ D.M Nephrology can be appointed as Guide or Co-guide.
- The Guide should be from the same University

Eligibility Criteria for Research Guide

- Permanent Faculty members employed as Professors or Associate Professors at Higher Educational Institutions, holding a Ph.D. and having a minimum of three research publications in peer-reviewed or refereed journals, are eligible to be recognized as Research Supervisors. This recognition applies to the university where the faculty member is employed or its affiliated Post-graduate Colleges/institutes.
- Ph.D. In Dialysis Therapy or Ph.D. in any Allied & Healthcare Professions with minimum 3 scientific publications in Accredited National/International Journals or D.M Nephrology with minimum 3 scientific publications in Accredited National/International Journals. (SCOPUS/WOS/PUBMED/UGC Care)
- Maximum age to be a guide shall be 65 years.

- Guide cannot have more than 10 candidates at any given point of time.
- Candidate can have Co-Guide from other discipline, if required.

Research Scholars

- Full time research scholars are those who register for Ph.D. on full time basis and are not employed anywhere.
- Part time research scholars are those who are presently employed in any College/ Hospital/ Institute.
- The scholars can select the guide from the list of guides recognized by the respective University.

Eligibility Criteria for Research Scholars

- Full time Post Graduate degree in Dialysis Therapy from a recognized university for enrolment in Ph.D. in Dialysis Therapy in the respective University.
- The scholars should have passed Post Graduate with a minimum of 55% marks.
- Working in Teaching Institution/Hospital can opt for Part Time PhD.

Criteria for Selection

- Selection for the Ph.D. Program will be based on merit or by university entrance examination.

Duration

- Full time: Three years, maximum of 6 years.
- Part time: Four years, maximum of 7 years.
    - A candidate can register for Ph.D. program on part time basis.
    - A candidate should complete research work and submit the thesis to the University within four years from the date of provisional registration.
    - Maximum period for submission of thesis will be Seven years from the date of provisional registration subject to the approval from the Board of Research Studies/Doctoral Studies on the recommendations of the guide. There will be no provision for further extension of the period.

- **No Higher Educational Institution or research institution of the Central government or a State Government shall conduct Ph.D. (Dialysis Therapy) programmes through distance and/or online mode.**
- **No Candidate shall be admitted for Ph.D in Dialysis Therapy in Distance Education and / or Online mode.**

Board of Research/Doctoral Studies

The Board/Committee will consist of

- Dean
- Ph.D. qualified Committee Members
- One or Two Subject Experts.

Progress Report

After provisional registration, every candidate shall submit half yearly progress report regularly through the guide.

Half yearly report shall be submitted for the period from 1st January to the end of June and from 1st July to the end of December. However, the first report for the fraction of six months period shall be submitted ending either in June or December.

The half yearly progress report shall cover the following aspects:

- Progress in the review of literature,
- New data acquired or theoretical background/techniques developed,
- Progress/Standardization in research methodology,
- Discussion of the work done.

If the candidate fails to submit two consecutive half yearly progress reports in time, his/her provisional registration shall stand cancelled.

If two consecutive half yearly progress reports are not satisfactory, the Board/respective Committee shall recommend to the University for Cancellation of the registration.

Pre-Ph.D. Examination

The provisional registration of the candidate shall be confirmed only after he/she has passed the Pre-Ph.D. examination which shall be conducted after the completion of one year from the date of provisional registration of the candidate.

The scheme of Pre-Ph.D. examination to be conducted by the University shall be as follows:

Sr No	Subject	Marks	Passing Marks
Paper I	Research Methodology & Biostatistics	100	55
Paper II	Domain Specific- Dialysis Therapy & Renal Sciences	100	55

Assessment, Evaluation methods and Minimum standards/credits required

After successfully completing the coursework and achieving the marks/grade specified above, the Ph.D. scholar must undertake research work and produce a draft dissertation/thesis.

The candidate who has completed the minimum required period of three or four years of prescribed research from the date of provisional registration, with at least three months remaining before the maximum period prescribed for thesis submission, may submit an application. This application, along with three copies of the thesis synopsis, is to be submitted through the Guide and the Head of the institution to the respective Board of Research Studies/Committee, following University procedures.

Prior to submitting the dissertation/thesis, the Ph.D. scholar is required to deliver a presentation before the Research Advisory Committee of the respective Institution.

Upon approval, two copies of the approved final synopsis (in hard copy/CD format) are forwarded to the Board of Research/Doctoral Studies/Evaluation Committee. This committee proceeds to constitute a Board of Examiners for the adjudication of the Ph.D. thesis, ensuring readiness prior to the thesis submission.

The concerned Higher Educational Institution must have a mechanism, utilizing well-developed software applications, to detect plagiarism in research work. Research integrity is an essential component of all research activities leading to the award of a Ph.D. degree.

A Ph.D. scholar must submit the thesis for evaluation within six months after the final synopsis submission, along with (a) a declaration from the Ph.D. scholar confirming the absence of plagiarism and (b) a certificate from the Research Supervisor affirming the originality of the thesis and stating that the thesis has not been submitted for the award of any other degree/diploma from any other Higher Educational Institution.

The Ph.D. thesis submitted by a Ph.D. scholar will be evaluated by their Research Supervisor and at least two external examiners who are experts in the field and not employed by the concerned Higher Educational Institution. These examiners should be academics with a strong record of scholarly publications in the field. Whenever feasible, one of the external examiners should be selected from outside India. The viva-voce examination panel will include the Research Supervisor and at least one of the two external examiners. The viva-voce examination will be open to members of the Research Advisory Committee, faculty members, research scholars, and students.

The viva-voce examination of the Ph.D. scholar to defend the thesis will be conducted if both external examiners recommend acceptance of the thesis after incorporating any suggested corrections. If one of the external examiners recommends rejection, the concerned Institution will forward the thesis to an alternate external examiner from the approved panel of examiners, and the viva-voce examination will only be held if the alternate examiner recommends acceptance of the thesis. If the alternate examiner does not recommend acceptance of the thesis, the thesis will be rejected, and the Ph.D. scholar will be deemed ineligible for the award of a Ph.D.

Award of Ph.D. Degree

The degree will be awarded by the University, after the candidate successfully completes Viva-Voce examination. The Chairperson shall consolidate the recommendations for the award of Ph.D. degree based on the following:

- The report of examiners who adjudicated the thesis,
- Evaluation of the candidate's performance in the Viva-Voce examination.

The Chairperson shall forward the consolidated and individual reports with recommendation to the of the University. Based on these reports, the University shall award the Ph.D. degree after the recommendations are approved by the Vice-Chancellor.

Submission of Thesis in Shodhganga

All candidates from any University, including deemed-to-be universities in India, are required to submit their theses to Shodhganga. Theses can be submitted by candidates, supervisors, or university representatives using the format prescribed by the INFLIBNET Centre.

Universities are responsible for providing computer and network infrastructure, software, and support staff to assist researchers in submitting their theses and dissertations online.

It is mandatory for universities to submit soft copies of theses and dissertations to the INFLIBNET Centre within one month of awarding doctoral degrees.

Academic, research, administrative, and infrastructure prerequisites for Colleges to be recognized for offering Ph.D. programs are as follows:

Colleges/Institution which offer Post-graduate Programs, are eligible to offer Ph.D. programs if they fulfill the criteria for eligible Research Supervisors, necessary infrastructure, and requisite administrative and research facilities.

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Chapter 6

Job description

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Chapter 6: Job Description for all levels

Diploma in Dialysis Therapy Technology

1	JOB TITLE	DIALYSIS CARE ASSOCIATE
2	JOB PURPOSE	PERFORMING DIALYSIS, MONITORING PATIENTS, MACHINE MAINTENANCE & ICU DIALYSIS
3	ACCOUNTABLITY	HEAD OF DEPARTMENT/ DIALYSIS THERAPIST/ DIALYSIS TECHNOLOGIST
4	QUALIFICATION	DIPLOMA IN DIALYSIS TECHNOLOGY

CLINICAL CARE RESPONSIBILITIES:

- Sets up, operates, and cleans the hemodialysis machine.
- Basics of Peritoneal Dialysis
- Performing hemodialysis in dialysis unit and ICU. Connects patients to the hemodialysis machines, with aseptic precautions performs cannulation (simple arteriovenous fistula (AVF) and arteriovenous grafts (AVG)), handles jugular, subclavian and femoral catheters.
- Planning & implementation of the dialysis prescription and execution of hemodialysis therapy.
- Documentation of patient data on charts as per unit policies.
- Managing various intra-dialytic complications, notifies shift supervisor of any unusual change in the patient's condition and performing related duties as assigned under the supervision of dialysis therapist, physician or nephrologist.

CLINICAL OUTCOMES RESPONSIBILITIES:

- Patient education, psychosocial and diet counseling of dialysis patients.
- Maintaining and monitoring, dialysis adequacy, clinical quality practices and infection control within the dialysis unit as per unit policies.

EQUIPMENT & REUSE PRACTICE RESPONSIBILITIES:

- Supervise the proper functioning, preventive maintenance, conduct minor repairs of the dialysis machines and reverse osmosis water systems.
- Setting up and monitoring the dialysis system and machines as per unit protocols.
- Maintenance of infection control practices by regular dialysis machine and equipment disinfection as per unit protocols.
- Ensure mandatory compliance of guideline-based reuse practices of dialysis disposables when applicable.

Bachelor in Dialysis Therapy Technology/BDTT

1	JOB TITLE	DIALYSIS THERAPY TECHNOLOGIST
2	JOB PURPOSE	PERFORMING EXTRACORPOREAL BLOOD THERAPIES, MONITORING PATIENTS, MACHINE MAINTENANCE & ICU EXTRACORPOREAL BLOOD THERAPIES
3	ACCOUNTABLITY	HOD/ DIALYSIS THERAPIST
4	QUALIFICATION	BACHELOR IN DIALYSIS THERAPY TECHNOLOGY (3 YEARS+ ONE-YEAR INTERNSHIP)

CLINICAL CARE RESPONSIBILITIES:

- Planning implementation of the dialysis prescription, execution of regular hemodialysis therapy.
- Assumes the role of a shift supervisor and supervise the Dialysis Care Associates.
- Performing extracorporeal therapies in the dialysis unit and ICU such as slow continuous therapies (CRRT), SLED (slow low efficiency dialysis), Hemoperfusion, Plasmapheresis, Isolated ultrafiltration, peritoneal dialysis, and MARS in the dialysis and ICU.
- Managing under the supervision various intra-dialytic complications or referring to the dialysis physician or nephrologist.
- Documents and maintains dialysis patient records (e.g. patient daily log, treatment records and charts, dialysis machine maintenance, service records, laboratory equipment and-blood chemistry data, and other auxiliary dialysis equipment, water treatment maintenance records etc.).
- Assists in the training of care givers/family members of outpatients in the operation of the hemodialysis machines to facilitate home hemodialysis or peritoneal dialysis.
- Performing both acute, and chronic peritoneal dialysis. Aiding patient selecting for CAPD, CCPD and NIPD based on their convenience and economic status. Educating and training patients on peritoneal dialysis procedures and sterile techniques. Maintaining data and records for analysis and improve patient outcomes. Counseling PD patients on psychosocial needs, educating on nutritional needs in coordination with dietitians and transplant needs in consultation with nephrologist.
- Preparation of daily and weekly reports.
- Maintaining data and records for analysis and improve patient outcomes. Coordinate the care of potential renal transplant patients and donor by facilitating testing, maintaining documents and communicating with the transplant team.
- Assist in the procedures for AVF creation, PD catheterization and Transplantation.

CLINICAL OUTCOMES RESPONSIBILITIES:

- Patient education, psychosocial and diet counseling of dialysis patients.
- Maintaining and monitoring, dialysis adequacy, clinical quality practices and infection control within the dialysis unit as per unit policies.

EQUIPMENT & REUSE PRACTICE RESPONSIBILITIES:

- Supervise the proper functioning, preventive maintenance, conduct minor repairs of the dialysis machines and reverse osmosis water systems.
- Setting up and monitoring the dialysis system and machines as per unit protocols.
- Maintenance of infection control practices by regular dialysis machine and equipment disinfection as per unit protocols.
- Ensure mandatory compliance of guideline based reuse practices of dialysis disposables when applicable.
- Stock and inventory management

1	JOB TITLE	TRANSPLANT CO-ORDINATOR
2	JOB PURPOSE	PATIENT ASSESSMENT, COUNSELING AND EDUCATION, COORDINATION OF CARE, ORGAN PROCUREMENT AND ALLOCATION
3	ACCOUNTABLITY	TRANSPLANT PHYSICIAN
4	QUALIFICATION	BACHELOR IN DIALYSIS THERAPY TECHNOLOGY/ MASTERS IN DIALYSIS THERAPY

JOB SUMMARY

From the initial evaluation to the post-transplant care, the kidney transplant coordinator is crucial in arranging every facet of kidney transplant operations. Assuring a seamless transition through each stage of the transplant process entails working in tandem with patients, families, and healthcare professionals in this position. In order to give patients receiving kidney transplants thorough support, the renal transplant coordinator needs to be highly skilled in clinical expertise, interpersonal relations, and organization.

RESPONSIBILITIES

- Patient Assessment
  Perform comprehensive evaluations, such as a review of medical history, physical examination, and psychosocial assessment, on individuals who have been recommended for kidney transplantation.
- Counseling and education
  Inform patients and their families about the surgical procedures, post-transplant care, and pre-transplant requirements associated with kidney transplantation. During the transplant process, offer counseling and emotional support.
- Coordination of Care
  Coordinate pre-transplant assessments, testing, and surgical readiness in conjunction with multidisciplinary teams comprising nephrologists, surgeons, social workers, and dietitians.
- Organ Procurement and Allocation
  To ensure prompt organ allocation and transplantation, facilitate contact among transplant centers and organ procurement organizations (OPOs). Organize the logistics and transportation for the organ retrieval and transplantation processes.
- Patient Advocacy
  Ensure patients receive the right resources and care throughout the transplant process by speaking up for their needs and preferences within the healthcare system.
- Documentation and Compliance
  Maintain accurate and complete documentation of all activities relating to transplants, treatment plans, and patient assessments. Verify adherence to transplant program policies and legal requirements.
- Documentation and Compliance
  Ensure that all patient evaluations, treatment regimens, and transplant-related activities are accurately and currently documented. Verify adherence to transplant program policies and legal requirements.
- Follow-up Care
  Follow monitoring of the patient's post-transplant development, including laboratory testing, medication compliance, and management of complications. Provide ongoing support and education to optimize long-term transplant outcomes.
- Quality Improvement
  Participate in quality improvement initiatives aimed at enhancing transplant program efficiency, patient satisfaction, and clinical outcomes.
- Research and Education:
  Follow up with developments and industry best practices related to kidney transplant research. Engage in ongoing education programs and make suitable contributions to research projects.

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1	JOB TITLE	VASCULAR ACCESS COORDINATOR
2	JOB PURPOSE	PATIENT ASSESSMENT, ACCESS PLANNING, COUNSELING AND EDUCATION, ACCESS MONITORING
3	QUALIFICATION	BACHELOR IN DIALYSIS THERAPY TECHNOLOGY/ MASTERS IN DIALYSIS THERAPY

JOB SUMMARY

The vascular access coordinator plays a critical role in managing the vascular access needs of patients requiring hemodialysis. The primary responsibility of this role is to oversee the implantation and maintenance of vascular access devices, including central venous catheters (CVCs), arteriovenous grafts (AVGs), and arteriovenous fistulas (AVFs), in order to guarantee the best possible results for hemodialysis patients. The vascular access coordinator works in conjunction with patients, families, and medical professionals to evaluate available vascular access alternatives, expedite the access process, and offer continuous support and monitoring.

RESPONSIBILITIES

- Patient Assessment
  Perform thorough evaluations, encompassing vascular mapping, physical examinations, and reviews of medical records, to determine the patients' requirements for vascular access. Analyze vascular access choices in light of the desires and unique circumstances of each patient.
- Access Planning
  Co-ordinate with surgeons, nephrologists, and other medical team members to create customized vascular access plans. As directed, coordinate the insertion of the CVC, the positioning of the AVG, and the formation of the AVF.
- Counseling and education
  Inform patients and their families about the advantages and disadvantages of various access options as well as the significance of vascular access for hemodialysis. Educate them on cannulation technique, access dysfunction indicators, and access care.
- Access monitoring:
  Utilize surveillance techniques, vascular ultrasonography, and routine physical examinations to keep an eye on the health of your vascular access. Recognize and promptly treat access-related issues such as infection, thrombosis, or stenosis.
- Access Maintenance
  To maximize the patency and lifespan of an access, coordinate operations such as thrombectomy, revision surgery, or angioplasty. Work along with vascular surgeons or interventional radiologists as necessary.
- Access Surveillance:
  Establish surveillance procedures in place to keep an eye on access flow rates, the suitability of dialysis, and problems related to access malfunction. Keep track of results and consult with the medical staff to inform treatment choices.
- Quality improvement
  Participate in quality improvement programs that are designed to minimize access-related issues and maximize the results of vascular access. Gather information and examine it to find patterns and areas where your process can be improved.

- Patient Advocacy
  Promote patient needs for timely access evaluation, intervention, and follow-up care within the healthcare system. Address the patient's preferences and concerns regarding vascular access choices and procedures.
- Collaboration and Communication
  Foster good communication and cooperation between the nephrology staff, dialysis nurses, vascular access surgeons, and interventional radiologists as well as other members of the healthcare team. Organize the transfer of care across hospital settings, dialysis centers, and outpatient clinics.

1	JOB TITLE	NEPHROLOGY PHYSICIAN ASSOCIATE
2	JOB PURPOSE	PATIENT ASSESSMENT, TREATMENT PLANNING, MEDICATION MANAGEMENT & PATIENT EDUCATION
3	QUALIFICATION	BACHELOR IN DIALYSIS THERAPY TECHNOLOGY/ MASTERS IN DIALYSIS THERAPY

Job summary

A Nephrology Physician Associate, also known as a Nephrology Physician Assistant (PA), is a healthcare professional who works closely with nephrologists to provide comprehensive care to patients with kidney diseases and disorders.

Job description

Their job description and responsibilities typically include:

- Patient Assessment
  Conducting in-depth physical examinations and medical histories of patients suffering from kidney-related conditions, such as kidney stones, hypertension, chronic kidney disease, and electrolyte abnormalities.
- Diagnostic Procedures
  Ordering and interpreting diagnostic tests to help with kidney disorders, including blood tests, urinalysis, imaging investigations (CT & MRI scans, ultrasounds), and kidney biopsies.
- Treatment Planning
  Collaborating with nephrologists to create customized treatment programs that may involve drug administration, dietary advice, lifestyle adjustments, and assessments for dialysis or kidney transplantation.
- Medication Management
  Administering drugs within their scope of practice to treat adverse effects like anemia and bone mineral abnormalities, blood pressure, manage symptoms, and slow the progression of renal disease. Under the guidance of a nephrologist, evaluating patients' medication regimens, prescribing appropriate medications to address kidney-related conditions and their complications, adjusting dosages based on patients' renal function, monitoring for potential drug interactions or adverse effects, and educating patients on proper medication adherence and management. Collaborating closely with other healthcare providers to ensure coordinated care and optimize treatment outcomes for patients with kidney diseases.
- Patient Education
  In order to support kidney health and enhance general well-being, patients and their families should be informed about kidney illness, available treatments, medication adherence, dietary restrictions, fluid intake control, and lifestyle changes.

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- Coordination of Care
  Collaborate with nephrology specialists, nurses, pharmacists, dietitians, social workers, and other medical professionals to provide patients with kidney problems with comprehensive and coordinated care.
- Clinical Procedures
  Conducting certain clinical tasks under a nephrologist's guidance, such as placing central venous catheters for hemodialysis access, and caring for kidney transplant recipients both before and after surgery.
- Patient Follow-up
  The process includes monitoring patient's development over time, evaluating the efficacy of treatment, handling issues, and modifying treatment plans as needed to maximize results and enhance quality of life.
- Documentation and Record-Keeping
  Maintaining up-to-date, accurate medical records that adhere to healthcare standards and laws, including progress notes, treatment plans, test findings, and medication histories.
- Professional Development
  Continual education and training, such as attending conferences, workshops, and continuing medical education (CME) events, in order to stay up to date with developments in nephrology, evidence-based practices, and regulatory needs.
- Overall, nephrology physician associates are essential members of the multidisciplinary care team that treats patients with kidney illnesses. They help provide excellent, patient-centered care and foster favorable health outcomes.

Masters in Dialysis Therapy /MDT

1	JOB TITLE	ASSISTANT PROFESSOR & DIALYSIS THERAPIST
2	JOB PURPOSE	TEACHING AND RESEARCH IN RENAL SCIENCES & DIALYSIS
3	ACCOUNTABLITY	HEAD OF DEPARTMENT
4	QUALIFICATION	MASTERS IN DIALYSIS THERAPY

CLINICAL CARE RESPONSIBILITIES:

- Supervises the activities of Dialysis Care Associates & Dialysis Technologists and auxiliary personnel on all shifts, including planning and scheduling.
- Providing expert support within the unit in the handling of all hemodialysis and peritoneal dialysis related and patient related issues, e.g. dialysis complications, dietary consultations, psychological care and vascular access issues in coordination with the nephrologists.
- Monitoring the dialysis patients for intra dialytic complications.
- Guiding and teaching the students about pediatric dialysis.
- Guiding the staff and students on dialysis unit policies, infection control and quality control standards as per unit polices.
- Quality maintenance and overall supervision of special procedures performed by the unit e.g. CRRT, ICU dialysis, pediatric dialysis, plasmapheresis, hemoperfusion, SCUF, and MARS.

- Supervising the conduct of regular ongoing patient education nutritional counseling programs in the dialysis unit.
- Overall care of patient outcomes, addresses patient satisfaction scores and patient safety issues.

CLINICAL OUTCOMES RESPONSIBILITIES:

- Patient education, psychosocial and diet counseling of dialysis patients.
- Maintaining and monitoring, dialysis adequacy, clinical quality practices and infection control within the dialysis unit as per unit policies.
- Supervising data documentation, data collection, data validation and outcomes evaluation within the unit.
- Preparation of quarterly and annual reports

EQUIPMENT & REUSE PRACTICE RESPONSIBILITIES:

- Supervise the proper functioning, preventive maintenance, conduct minor repairs of the dialysis machines and reverse osmosis water systems.
- Setting up and monitoring the dialysis system and machines as per unit protocols.
- Assist in implementing new or modified techniques; recommending the purchase of new equipment or the modification of present equipment; and maintaining adequate supplies for the performance of hemodialysis on the particular shift assigned
- Maintenance of infection control practices by regular dialysis machine and equipment disinfection as per unit protocols.
- Ensure mandatory compliance of guideline-based reuse practices of dialysis disposables when applicable to ensure quality clinical care.

ADMINISTRATIVE RESPONSIBILITIES:

- Evaluates the quality of hemodialysis services performed.
- Performs human resource related duties (e.g. employee evaluation, need for additional manpower, recommending promotions, compensation increases, conduct ongoing employee training and staff grievance redressals).
- Ensures that hemodialysis equipment is in proper operating condition.
- Evaluates the quality and quantity of supplies and equipment.

TEACHING RESPONSIBILITIES:

- Teaching of undergraduate (Bachelor's in Dialysis Therapy Technology and Master's in Dialysis Therapy) students and coordinating all academic programs, e.g. clinical and theoretical teaching, conducting assessments and examinations for the diploma, Bachelor's candidates and interns.

RESEARCH RESPONSIBILITIES:

- Encouraging, conducting and mentoring research.
- Enforcing ethical research standards

Ph.D. in Dialysis Therapy

1	JOB TITLE	PROFESSOR OR HEAD OF DEPARTMENT
2	JOB PURPOSE	CLINICAL CARE, TEACHING AND RESEARCH IN RENAL SCIENCES, DIALYSIS THERAPY
3	ACCOUNTABLITY	HEAD OF DEPARTMENT/ HEAD OF THE INSTITUTION
4	QUALIFICATION	Ph.D. IN DIALYSIS THERAPY

EQUIPMENT & REUSE PRACTICES:

- Supervise the implementation of all the policies, protocols and procedures within the dialysis unit.
- Ensure proper functioning, preventive maintenance, conduct minor repairs of the dialysis machines and reverse osmosis water systems.
- Maintenance of infection control and quality control practices as per unit protocols.
- Ensure mandatory compliance of guideline-based reuse practices of dialysis disposables when applicable.

CLINICAL & ADMINISTRATIVE RESPONSIBILITIES:

- Supervises the activities of all categories of hemodialysis staff and auxiliary personnel on all shifts, including planning, and scheduling as per unit policies.
- Confers with nephrologists, physicians, nurses to schedule patients, determine individual patient treatment time and establish patient triage for dialysis depending on comorbidity and severity of disease.
- Supervises the maintenance of all patient records, laboratory parameters.
- Evaluates the quality of hemodialysis services performed.
- Overall care of patient outcomes, patient satisfaction scores and patient safety issues.
- Performs human resource related duties (e.g. recommending promotions, compensation increases, conduct ongoing employee training and staff grievance redressals).
- Evaluates the quality and quantity of supplies and equipment.
- Ensures that hemodialysis equipment is in proper operating condition.
- Formulating a dialysis unit policy and procedures manual to ensure quality clinical care and quality administrative governance of the unit.
- Implements departmental policies and procedures and recommends changes as necessary. Coordinates activities of the hemodialysis unit with the other departments/facilities of the organization.
- Keep abreast of current trends in hemodialysis techniques and management to ensure ongoing organizational change and learning to improve patient care and outcomes.

TEACHING RESPONSIBILITIES:

- Teaching of undergraduate (Bachelors and Masters dialysis therapy) students and coordinating all academic programs, e.g. clinical and theoretical teaching, conducting assessments and examinations for the diploma, Bachelors & Masters candidates and interns with documentation as needed.
- Planning and implement ongoing staff educational and skills training programs with continual assessments and monitoring outcomes thereby ensuring on going organizational learning in consultation with the head of department and nephrology staff.

RESEARCH RESPONSIBILITIES:

- Design, plan, and execute research studies focused on advancing dialysis therapy. This includes literature reviews, experimental design, data collection, analysis, and interpretation.
- Collaborate with multi-disciplinary teams to identify areas for innovation in dialysis therapy. Develop novel approaches, technologies, or treatment modalities to address unmet needs in patient care.
- Guide the students to utilize statistical methods and data analysis techniques to extract meaningful insights from research data. Interpret findings and draw conclusions to inform future research directions.
- Motivate and guide the students/ scholars to prepare research findings for publication in peer-reviewed journals and presentations at scientific conferences. Stay abreast of developments in the field and contribute to the scientific community through dissemination of research results.
- Ensure compliance with regulatory requirements and ethical standards in all research activities. Maintain accurate and detailed records of research protocols, procedures, and results.
- Guide and Manage research projects from inception to completion, including budgeting, timeline management, and resource allocation. Coordinate with internal and external partners to achieve project milestones and objectives.

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Annex- 1

List of Recommended Books for Diploma

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
5. Teitz, Clinical Chemistry. W.B. Saunders Company Harcourt (India) Private Limited New Delhi.
6. Vasudevan D. & Sree Kumari S., Text Book of Bio Chemistry for Medical Students, Jaypee Brothers, New Delhi.
7. Biochemistry, U. Satyanarayan, Books and Allied (P) Ltd. Kolkata-India
8. Das Debajyothi, Biochemistry, Academic Publishers Calcutta.
9. Tripathi K.D. (2008) Essentials of Pharmacology 6th Ed, Jaypee Brothers medical publishers: New Delhi
10. Rang H.P., (1995) Pharmacology 3rd Ed, and Churchill Livingstone: Michigan
11. Himmelfarb, J., Savegh, M. H.,(2010) Chronic Kidney disease, Dialysis, transplantation: Companion to Brenner & Rector's Kidney 3rd Ed, Elesvier: St Louis
12. Tripathi, K.D.,(2010). Pharmacological Classification of drugs, doses and Preparations 4th Ed, Jaypee Brothers medical publishers: New Delhi
13. Ajay, P., Medhi - Bikash (2010). Pharmacology, Jaypee Brothers medical publishers: New Delhi
14. Davison A.M., (2010) Oxford textbook of Nephrology Volume 4 Oxford University Press
15. Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences
16. Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins
17. Claude Jacobs.(1996) Replacement of Renal Function by Dialysis Springer
18. Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus
19. Davison A.M., (2010) Oxford textbook of Nephrology Volume 4 Oxford University Press
20. Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer
21. Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.
22. Feehally J., Floege, J., Johnson R.J., (2007) Comprehensive Clinical Nephrology 3rd Ed Mosby
23. Daugirdas J.T., Blake P.J., Todd S., (2000), Handbook of Dialysis, Volume 236 Lippincott Williams & Wilkins

List of Recommended Books for UG

1. Human anatomy by B.D.Chaurasia's
2. Gray's Anatomy
3. Manual of practical physiology – A.K.Jain
4. Medical Physiology- Guyton
5. Text Book of Pathology - Harsh Mohan
6. Basic Pathology – pocket Robbins
7. Harper's Biochemistry – 26th edition
8. Text Book of Biochemistry – DM Vasudevan
9. Psychology – The Sciences of Behaviour - Fifth edition 1982 - Neil Carlson -William Bulkist - Allyn and Bacon.
10. Psychology made simple - Abraham Sperling, Ph D - Advisory editor - M.S Gill. MA., Ph D - 'Made simple books' - W.H.Allen, London.
11. Developmental Psychology - David R Schaffer - 2nd edition 1989 - Books/Cole publishing companyPacific Gnaue, California
12. Psychology - Lefton. L - III edition 1985 - Allyn and Bacan
13. Medical Terminology: A Short Course,7th Edition, Author: Davi-Ellen Chabner, Saunders Publishers
14. Medical Terminology & Anatomy for Coding , 3rd Edition (2017), Author : Betsy J. Shiland, Mosby Publisher
15. Introduction to computers & Data processing – Shelly, Gray. B
16. Information Technology – Dennis P Curtin
17. An Introduction to Computer Applications in Medicine – N. F. Kember
18. Medical Records Organization & Management – G.D Mogli
19. Computer Aided Tomography & Ultrasonics in Medicine – J. Raviv, J.F. Greeniat
20. Introduction to Biostatistics and Research Methods by Sunder Rao PSS Y Richard J . PHI publishers 2012.
21. Biostatistics: A Foundation for Analysis of Health Sciences by Danial WW. John Wiley Publishers
22. Research Methods: Methods and Techniques by Kothari CR. New Age International Publishers- 2004
23. Research Methodology: A step by Step Guide to Beginners by Ranjit Kumar. SAGE Publishers-2014.
24. Mosby's paramedic text book,
25. Barbara paramedic practice today
26. Medical Pharmacology – PadmajaUdaykumar
27. ECG made easy – John R. Hampton
28. Medical pharmacology – Padmaja Udaykumar
29. Handbook of Dialysis – Daugirdas
30. Essentials of Medical Pharmacology- K.D.Tripati, 8th edition
31. Textbook of Pathology- P.HarshMohan , 8th edition (2018)
32. Basic pathology -Robbin , 10th edition, Elseivier
33. Principle and Practices of Medicine -Davidson , 23rd edition (2018)
34. Kidney Diseases in Primary care-Anil K. Mandal, N.StanleyNahman, (1998)
35. Pocket companion to Robbins andCotran Pathologic Basics of Diseases, 8th edition (2011)
36. Primer on Kidney Diseases-Arthur GreenBerg , 5th edition(2010), Elsevier

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37. Oxford Textbook of Clinical Nephrology -Neiljuna,Norbert Lameire, David J. Goldsmith, Christopher G.Winarls, Jonathan Himmil farb, Giuseppe Remuzzi ,4th edition (2015)
38. Handbook of Dialysis Therapy- Allen .R. Nisseson,RichardN.Fine ,5th edition
39. Principles and Practice of Dialysis -Henrich, 5th edition(2016), Wolterskluwer
40. Oxford Handbook of Dialysis - Jeremy Levy, Edwina Brown, Anastasia Lawrence, 4th edition (2016)
41. Handbook of Kidney Transplantation- Gabriel M. Danovitch, Wolters Kluwer
42. Textbook of Peritoneal Dialysis-Nolph and Gokal, 3rd edition(2009), Springer
43. .Handbook of Kidney Transplantation- Gabrieb M. Danovilch, 6th edition (2017),Wolters

List of Recommended Books for PG.

1. Gray's Anatomy
2. Clinical oriented anatomy by Keith.L.Moore
3. Histology- inderbir singh
4. Embryology: Langman's & inderbir singh
5. Human anatomy by B.D.Chaurasia's
6. Gray's Anatomy for the students – Richard L.Drake
7. Medical Physiology- Guyton
8. Physiology- Ganong
9. Monoglam – Morby series- kidney – Bruce M.Koepen & Bruce A.Stanton
10. Manual of practical physiology – A.K.Jain
11. Anatomy and physiology in health and illness – Ross and Willson
12. Text Book of Pathology - Harsh Mohan
13. Basic Pathology – pocket Robbins
14. Harper's Biochemistry – 26th edition
15. Text Book of Biochemistry – DM Vasudevan
16. Lippincott's illustrated reviews – Biochemistry- Pamela C. Champey, Richard A Harvey.
17. Clinical Chemistry- Zilva, Philip Mayher
18. Clinical Diagnosis and Management by Laboratory Methods – 17th edition- Todd, Sanford – Henry
19. Biochemistry – Devlin.
20. ABC of Clinical Genetics, Third Edition, Helen M Kingston, Consultant Clinical Geneticist,Regional Genetic Service, St. Mary's Hospital, Manchester, UK.
21. Practical Genetic Counseling: Peter S. Harper MA, DM, FRCP, Fifth Edition, Arnold Publishers.
22. Paniker – Medical Microbiology.
23. Textbook Medical Microbiology- Gupta.
24. Robbin's Basic pathology
25. Pathology illustration Macfarlare Reid, Callandra
26. Essential Immunology – Ivan Roitt
27. Clinical Immunology – Gupta
28. Text Book - KUBE
29. Pharmacology and pharmacotherapeutics – R.S.Sataskar.
30. Tripathi – Pharmacology
31. Medical Pharmacology – Padmaja Uday Kumar

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32. Research Methodology Methods &Techniques (Second Edition) – C.R.Kothari
33. Research Methodology by Palaniswamy and Shanmugavel
34. Nair S K. Essential Research Methodology, Epidemiology and Biostatistics. In:
35. ShobhaTandon, editor. Text Book of Pedodontics, 2~ ed. Hyderabad: Paras Publishing;
36. Armitage P, Berry G. Statistical methods in medical research, 3rd ed. London: Blackwell Scientific Publications; 1994.
37. Daniel W W. Biostatistics: A foundation for analysis in health sciences, 2nd ed. New York; John Wiley and Sons, 1987
38. Primer of Bio-statistics by Stanton A. Glantz
39. Statistics in Medicine, II edition by R.H. Riffen Burgh
40. Biostatistics-A foundation for analysis in the Health Science by Wayne W. Daniel
41. Sundar Rao P. and Richard J. Introduction to Biostatistics: A Manual for Students in
42. Health Sciences. Prentic-Hall of India Pvt. Ltd, New Delhi.
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44. Medical Instrumentation- Application and design by John G. Webster
45. Introduction to Biomedical equipment technology by Joseph J. Carr
46. Principles of Applied Biomedical Instrumentation by L.A. Geddes
47. Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese.
48. Introduction to Biomedical Equipment Technology by Joseph J.Carr, John m. Brown
49. Kidney- Electrolyte Disorders- Chan, Gill
50. Clinical Physiology of Acid- Base and Electrolyte Disorder-Rose
51. Primer kidney Diseases – Arthur Green Berg
52. The Kidney – By Barry Brenner, Floyd
53. Clinical Dialysis, Dialysis Therapy- By Nissenson, Fine
54. Clinical Approach Emergency Medicine – Robert, Hedges
55. Critical care – Civetta, Taylor, Kirby
56. Clinical protection of anaesthesia – Miller
57. Essential of Nutrition and dietics therapy
58. Principles of Nutrition Assessment – Gibson
59. Human Nutrition and Dietics – Davidson
60. Jelliffe, D. B.: Assessment of the Nutritional Status of the Community; World Health Organization.
61. Mahan, L.K. and Escott- Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
62. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
63. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.
64. X-ray diagnosis and imaging –Gupta
65. Nuclear Medicine- K.O'Conner
66. Radiology of the kidney and genito urinary tract – Davidson's
67. USG – Sander's
68. Principles of Management by Koonz 'o' Donnel
69. Hospital planning Administration by B.M. Shakar
70. Brenner- The kidney
71. Kidney disease in primary care and K. Mandal, Stanly
72. The disease of Kidney –Schrier
73. Complications of dialysis- By Norbert Lemeire, Ravindra Mehta
74. Dialysis technology- By Jim Curtis , Philip Varughese

75. Hand book of dialysis – By Daugirdas, Peter Gerard Blake
76. Renal Nursing – By Nicola Thomas
77. Review of HD – By C.F. Butch, Martha H Stoner, Anna L. Corea
78. Shailendra K. Singh: Safety & Risk Management, Mittal Publishers
79. J. H. Diwan :Safety, Security & Risk Management, APH
80. Stephen Ayers & Garmvik: Text Book of Critical Care, Holbook and Shoemaker
81. Kidney Transplantation- Morris
82. Danovitch, Manual of Renal Transplantation, 6e, .
83. Clinical urologic practice- Stein
84. Techniques in endourology- Clayman
85. Kidney transplantation rejection-Racusen, Splez.
86. Psychological testing – Kaplan
87. Dialysis and transplantation in psychiatry – Lange.

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Annex- 2

List of Recommended Journals

Journals:

1. The Nephron
2. Indian Journal of Nephrology
3. Indian Journal of Peritoneal Dialysis
4. Dialysis and Transplantation
5. Renal Sciences
6. International Journal of Nephrology
7. Hemodialysis International
8. Nephrology Dialysis and Transplantation
9. Therapeutic Apheresis and Dialysis
10. Peritoneal Dialysis International

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Annex- 3

Diploma in Dialysis Technology Log Book

Instructions

1. Following log book should be maintained for all five Semesters.
2. Print out of the sheets may be depended on the no of cases/ clinical quota mentioned in chapter 4.
3. Certificate of the Log Book should be only signed after end of each year.
4. Log book has been divided into three sections.
5. Log book needs to be checked & verified daily.
6. Posting Areas for Each Semesters:

Section	Semester	Posting Area
Section 1	Semester 1 & Semester 2	Dialysis Unit & Procedure Room for Renal Biopsy, Central Venous Catheter Insertion & , Central Venous Catheter Removal Observation
Section 2	Semester 3 & Semester 4	Dialysis Unit & PD
Section 3	Internship	Dialysis unit

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HEMODIALYSIS RECORD SHEET

Date:

Name: Age & Sex: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:

Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assesment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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HEMODIALYSIS CIRCUIT PREPARATION

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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INITIATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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TERMINATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

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RENAL BIOPSY

Sr. No	Name	Date	Hospital No	Indications	Site of Sample collection	Complications during procedure	Signature

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Verified By:

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Central Venous Catheterization

Sr. No	Name	Date	Hospital No	Indications	Location of Catheterization	Complications during procedure	Signature

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Section 2: Diploma in Dialysis Technology - Semester 3 & Semester 4

HEMODIALYSIS RECORD SHEET

Name: Age & Sex: Date:
Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:

Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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HEMODIALYSIS CIRCUIT PREPARATION

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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TERMINATION OF HEMODIALYSIS

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Signature Of Faculty :

REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

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PD CASE RECORD

NAME: HOSP NO/OP NO:

AGE/SEX: ADDRESS:

HT: WT: BMI: BSA:

CONTACT NO: CONSULTANT:

DOA: DOD:

ANTHROPOMETRIC ASSESMENT:

TSF: MAC: MAMC:

REASON FOR ADMISSION: PREVIOUS DATE OF VISIT:

PRIMARY DIAGNOSIS: VIRAL STATUS:

COMORBID CONDITION:

PATIENT COMPLAINT OF:

STATUS: DM/Yrs: HTN/Yrs: CAD/Yrs: VACCINATION:

PREVIOUS SURGERY UNDERGONE: YES/NO BLOOD GROUP:

NAME/DATE OF THE SURGERY DONE:

DATE OF PD CATHETERISATION:

TYPE OF CATHETER/SIZE:

DATE OF SUTURE REMOVAL:

FLUSHING DATES:

LOW SUPINE PD: YES/NO REASON FOR PD:

EXCHANGES STARTED ON:

PERCENTAGE/EXCHANGES/VOLUME:

UNDERGONE HEMODIALYSIS: YES/NO DURATION OF HD:

HD ACCESS:

PET: DATE:

ADEQUACY: DATE:

CREATININE CLEARANCE: DATE:

PREVIOUS HISTORY OF INFECTION/TREATMENT DONE:

TOTAL EPISODES/TYPE OF INFECTION: ORGANISMS INVOLVED:

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PRESENT PD PRESCRIPTION:

% OF BAG	NO.OF.EXCHANGE	VOLUME	URINE OUTPUT

PLAN:

BLOOD INVESTIGATION:

URINE CULTURE:

PUS CULTURE:

INFECTION TYPE:

EMPIRICAL TREATMENT:

ANTIBIOTICS GIVEN:

NO.OF.DAYS:

TREAMENT PRIOR TO CULTURE REPORT:

ORGANISM:

ANTIBIOTIC SENSITIVITY:

TC:

DC:

ANTIBIOTICS:

DOSAGE:

NO.OF.DAYS:

OTHERS:

TRANSPLANT COUNSELLING:

PATIENT EDUCATION:

NUTRITIONAL EDUCATION:

FOLLOW UP DATE:

COMMENTS:

PREPARED BY: **REPORTED BY:** **SIGNATURE OF FACULTY INCHARGE**

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PD DAILY RECORD SHEET

NAME: HOSP.NO/OP.NO:

DATE:

PD EXCHANGE DETAILS: PRE WEIGHT: POST WEIGHT:

NO	DEX %	PRE BP	POST BP	INPUT	OUTPUT	DWELL TIME	UF	CUF	REMARKS
1									
2									
3									
4									
5									

ANTIBIOTICS GIVEN: DOSAGE: NO.OF DAY:

FLID INTAKE: URINE OUTPUT:

NET UF:

PATIENT COMPLAINTS:

EXIT SITE DRESSING: EXIT SITE SCORE:

EXIT SITE APPERANCE:

SWELLING: CRUST: REDNESS: PAIN: DRAINAGE:

INVESTIGATIONS:

1. SERUM ANALYSIS:

HB ___ PCV ___ TC ___ DC ___ BUN ___ CREAT ___ K+ ___ Na+ ___ Hco3 ___ URIC ACID ___ ALBUMIN ___ T.PROTEIN ___

2. PD FLUID ANALYSIS:

TC ___ DC ___ AFB ___ TB PCR ___

FUNGAL SMEAR ___ GRAM STAIN ___

ORGANISM GROWTH: ANTIBIOTIC SENSITIVITY:

MEDICATIONS:

PREPARED BY: **VERIFIEDBY:** **SIGNATURE OF FACULTY:**

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Section 3: Diploma in Dialysis Technology – Internship

HEMODIALYSIS RECORD SHEET

Name: Age & Sex: Date: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:

Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

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HEMODIALYSIS CIRCUIT PREPARATION

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S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

Verified By : **Signature Of Faculty :**

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S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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Signature Of Faculty :

WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

Verified By :

Signature Of Faculty :

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Annex- 4

Bachelors in Dialysis Therapy Technology Log Book

Instructions

1. Following log book should be maintained for all Six Semesters.
2. Print out of the sheets may be depended on the no of cases/ clinical quota mentioned in chapter 4.
3. Certificate of the Log Book should be only signed after end of each year.
4. Log book has been divided into four sections. One section for each year.
5. Log book needs to be checked & verified daily.
6. Posting Areas for Each Semesters:

Section	Semester	Posting Area
Section 1	Semester 1 & Semester 2	Nephrology OPD, Nephrology Ward, Dialysis Unit & Procedure Room for Assisting in Renal Biopsy
Section 2	Semester 3 & Semester 4	Nephrology OPD, Nephrology Ward, Dialysis Unit & Procedure Room for Assisting in Renal Biopsy, Central Venous Catheterization & PD Catheterization
Section 3	Semester 5 & Semester 6	Dialysis unit, ICU, Renal transplants work up, Operation Theater for Observing AVF/AVG Creation, PD catheter Insertion & Renal Transplantation.

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Section 1: Bachelors in Dialysis Therapy Technology
Semester 1 & Semester 2
OPD RECORD SHEET

Name: Date:

Hosp No: Age & Sex Ht: Wt:

Blood Group: BMI: BSA:

Major Complains: Biochemical Test:

History: Pathological Test:

Microbiological Test:

Diagnosis: Treatment/ Medications:

Advice:

Next Follow Up:

Verified By : Signature Of Faculty:

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NEPHROLOGY WARD RECORD SHEET

Name: Date:

Hosp No: Age & Sex Ht: Wt:

Blood Group: BMI: BSA:

Major Complains: Biochemical Test:

History: Pathological Test:

Microbiological Test:

Diagnosis: Treatment/ Medications:

Fluid Intake: Fluid Output:

Vitals

BP: Pulse: SPO_2:

Temperature:

Verified By: Signature Of Faculty:

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Renal Biopsy

Sr. No	Name	Date	Hospital No	Indications	Complications during procedure	Signature

HEMODIALYSIS RECORD SHEET

Date:

Name: Age & Sex: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
AVG Date

Dry Weight:

Vaccination Status:

Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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राष्ट्रीय सहबद्ध और स्वास्थ्य देखभाल पेशे आयोग

Section 2 Bachelors in Dialysis Therapy Technology
Semester 3 & Semester 4

OPD RECORD SHEET

Name: Date:

Hosp No: Age & Sex: Ht: Wt:

Blood Group: BMI: BSA:

Major Complains: Biochemical Test:

History: Pathological Test:

Microbiological Test:

Diagnosis: Treatment/ Medications:

Advice:

Next Follow Up:

Verified By: Signature Of Faculty:

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NEPHROLOGY WARD RECORD SHEET

Name: Date:

Hosp No: Age & Sex Ht: Wt:

Blood Group: BMI: BSA:

Major Complains: Biochemical Test:

History: Pathological Test:

Microbiological Test:

Diagnosis: Treatment/ Medications:

Fluid Intake: Fluid Output:

Vitals

BP: Pulse: SPO_2:

Temperature:

Verified By: Signature Of Faculty:

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Renal Biopsy

Sr. No	Name	Date	Hospital No	Indications	Site of Sample collection	Complications during procedure	Signature

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Central Venous Catheterization

Sr. No	Name	Date	Hospital No	Indications	Location of Catheterization	Complications during procedure	Signature

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सहयोगी और स्वास्थ्य देखभाल पेशे

Verified By:

Signature Of Faculty:

HEMODIALYSIS RECORD SHEET

Date:

Name: Age & Sex: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:
Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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NCAHP
Since-2021
सहयोग और स्वास्थ्य देखभाल पेशेवर आयोग

HEMODIALYSIS CIRCUIT PREPARATION

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
स्वास्थ्य सहयोगी व्यवसाय राष्ट्रीय आयोग
NCAHP
Since-2021

Verified By :

Signature Of Faculty :

INITIATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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NCAHP
Since-2021

Verified By :

Signature Of Faculty :

TERMINATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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NCAHP
Since-2021

Verified By : **Signature Of Faculty :**

REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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राष्ट्रीय सहयोगी एवं स्वास्थ्य देखभाल व्यवसाय आयोग
NCAHP
Since-2021

Verified By :

Signature Of Faculty :

WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

Verified By :

Signature Of Faculty :

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NCAHP
Since-2021

09

PD CASE RECORD

NAME: HOSP.NO/OP.NO:

AGE/SEX: ADDRESS:

HT: WT: BMI: BSA:

CONTACT NO: CONSULTANT:

DOA: DOD:

ANTHROPOMETRIC ASSESMENT:

TSF: MAC: MAMC:

REASON FOR ADMISSION: PREVIOUS DATE OF VISIT:

PRIMARY DIAGNOSIS: VIRAL STATUS:

COMORBID CONDITION:

PATIENT COMPLAINT OF:

STATUS: DM/Yrs: HTN/Yrs: CAD/Yrs: VACCINATION:

PREVIOUS SURGERY UNDERGONE: YES/NO BLOOD GROUP:

NAME/DATE OF THE SURGERY DONE:

DATE OF PD CATHETERISATION:

TYPE OF CATHETER/SIZE:

DATE OF SUTURE REMOVAL:

FLUSHING DATES:

LOW SUPINE PD: YES/NO REASON FOR PD:

EXCHANGES STARTED ON:

PERCENTAGE/EXCHANGES/VOLUME:

UNDERGONE HEMODIALYSIS: YES/NO DURATION OF HD:

HD ACCESS:

PET: DATE:

ADEQUACY: DATE:

CREATININE CLEARANCE: DATE:

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NCAHP Since-2021

PREVIOUS HISTORY OF INFECTION/TREATMENT DONE:

_____

_____

TOTAL EPISODES/TYPE OF INFECTION: ORGANISMS INVOLVED:

PRESENT PD PRESCRIPTION:

% OF BAG	NO.OF.EXCHANGE	VOLUME	URINE OUTPUT

PLAN:

BLOOD INVESTIGATION: URINE CULTURE:

PUS CULTURE: INFECTION TYPE:

EMPIRICAL TREATMENT:

ANTIBIOTICS GIVEN:

NO.OF.DAYS:

TREAMENT PRIOR TO CULTURE REPORT:

ORGANISM: ANTIBIOTIC SENSITIVITY:

TC: DC:

ANTIBIOTICS:

DOSAGE: NO.OF.DAYS:

OTHERS:

TRANSPLANT COUNSELLING: PATIENT EDUCATION:

NUTRITIONAL EDUCATION: FOLLOW UP DATE:

COMMENTS:

_____

_____

_____

PREPARED BY: **REPORTED BY:** **SIGNATURE OF FACULTY INCHARGE**

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NCAHP
Since-2021

PD DAILY RECORD SHEET

NAME: HOSP.NO/OP.NO:

DATE:

PD EXCHANGE DETAILS: PRE WEIGHT: POST WEIGHT:

NO	DEX %	PRE BP	POST BP	INPUT	OUTPUT	DWELL TIME	UF	CUF	REMARKS
1									
2									
3									
4									
5									

ANTIBIOTICS GIVEN: DOSAGE: NO.OF DAY:

FLID INTAKE: URINE OUTPUT:

NET UF:

PATIENT COMPLAINTS:

EXIT SITE DRESSING: EXIT SITE SCORE:

EXIT SITE APPERANCE:

SWELLING: CRUST: REDNESS: PAIN: DRAINAGE:

INVESTIGATIONS:

1. SERUM ANALYSIS:

HB ___ PCV ___ TC ___ DC ___ BUN ___ CREAT ___ K ___
Na^{2+} ___ Hco_3 ___ URIC ACID ___ ALBUMIN ___ T.PROTEIN ___

2. PD FLUID ANALYSIS:

TC ___ DC ___ AFB ___ TB PCR ___

FUNGAL SMEAR ___ GRAM STAIN ___

ORGANISM GROWTH: ANTIBIOTIC SENSITIVITY:

MEDICATIONS:

PREPARED BY: **VERIFIEDBY:** **SIGNATURE OF FACULTY:**

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Since-2021

Section 3 Bachelors in Dialysis Therapy Technology
Semester 5 & Semester 6
HEMODIALYSIS RECORD SHEET

Date:

Name: Age & Sex: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:

Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date			Remarks
Hemoglobin			Calcium	Date		
PCV			Phosphorus	KT/V		
Sr. Ferritin			Uric acid			
Sr Iron			SGOT	URR		
Sr. TIBC			SGPT			
TSAT			SAP			
Bun			T.Protein			
Sr. Creatinine			Sr.Albumin			
Sodium			iPTH			
Potassium			Vit D3			

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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Since-2021
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HEMODIALYSIS CIRCUIT PREPARATION

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

Verified By :

Signature Of Faculty :

NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
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NCAHP
Since 2021

INITIATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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Verified By :

Signature Of Faculty :

TERMINATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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Verified By :

Signature Of Faculty :

WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

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Verified By : **Signature Of Faculty :**

PD CASE RECORD

NAME: HOSP.NO/OP.NO:

AGE/SEX: ADDRESS:

HT: WT: BMI: BSA:

CONTACT NO: CONSULTANT:

DOA: DOD:

ANTHROPOMETRIC ASSESMENT:

TSF: MAC: MAMC:

REASON FOR ADMISSION: PREVIOUS DATE OF VISIT:

PRIMARY DIAGNOSIS: VIRAL STATUS:

COMORBID CONDITION:

PATIENT COMPLAINT OF:

STATUS: DM/Yes: HTN/Yes: CAD/Yes: VACCINATION:

PREVIOUS SURGERY UNDERGONE: YES/NO BLOOD GROUP:

NAME/DATE OF THE SURGERY DONE:

DATE OF PD CATHETERISATION:

TYPE OF CATHETER/SIZE:

DATE OF SUTURE REMOVAL:

FLUSHING DATES:

LOW SUPINE PD: YES/NO REASON FOR PD:

EXCHANGES STARTED ON:

PERCENTAGE/EXCHANGES/VOLUME:

UNDERGONE HEMODIALYSIS: YES/NO DURATION OF HD:

HD ACCESS:

PET: DATE:

ADEQUACY: DATE:

CREATININE CLEARANCE: DATE:

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NCAHP
Since-2021

PREVIOUS HISTORY OF INFECTION/TREATMENT DONE:

_____

_____

TOTAL EPISODES/TYPE OF INFECTION: ORGANISMS INVOLVED:

PRESENT PD PRESCRIPTION:

% OF BAG	NO.OF.EXCHANGE	VOLUME	URINE OUTPUT

PLAN:

BLOOD INVESTIGATION: URINE CULTURE:

PUS CULTURE: INFECTION TYPE:

EMPIRICAL TREATMENT:

ANTIBIOTICS GIVEN:

NO.OF.DAYS:

TREAMENT PRIOR TO CULTURE REPORT:

ORGANISM: ANTIBIOTIC SENSITIVITY:

TC: DC:

ANTIBIOTICS:

DOSAGE: NO.OF.DAYS:

OTHERS:

TRANSPLANT COUNSELLING: PATIENT EDUCATION:

NUTRITIONAL EDUCATION: FOLLOW UP DATE:

COMMENTS:

_____

_____

_____

PREPARED BY: **REPORTED BY:** **SIGNATURE OF FACULTY**

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Since-2021

PD DAILY RECORD SHEET

NAME: HOSP.NO/OP.NO:

DATE:

PD EXCHANGE DETAILS: PRE WEIGHT: POST WEIGHT:

NO	DEX %	PRE BP	POST BP	INPUT	OUTPUT	DWELL TIME	UF	CUF	REMARKS
1									
2									
3									
4									
5									

ANTIBIOTICS GIVEN: DOSAGE: NO.OF DAY:

FLID INTAKE: URINE OUTPUT:

NET UF:

PATIENT COMPLAINTS:

EXIT SITE DRESSING: EXIT SITE SCORE:

EXIT SITE APPERANCE:

SWELLING: CRUST: REDNESS: PAIN: DRAINAGE:

INVESTIGATIONS:

1. SERUM ANALYSIS:

HB ____ PCV ____ TC ____ DC _____ BUN ____ CREAT ____ K^+ ____
Na^{2+} ____ Hco_3 ____ URIC ACID ____ ALBUMIN ____ T.PROTEIN ____

2. PD FLUID ANALYSIS:

TC ____ DC _____ AFB _____ TB PCR _____

FUNGAL SMEAR _____ GRAM STAIN _____

ORGANISM GROWTH: ANTIBIOTIC SENSITIVITY:

MEDICATIONS:

PREPARED BY: **VERIFIEDBY:** **SIGNATURE OF FACULTY:**

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CONTINUOUS RENAL REPLACEMENT THERAPY ASSESSMENT SHEET

PATIENT DATA

Patient Name :

Age/Sex :

Hosp:No :

Diagnosis :

Reasons for CRRT :

Viral Status :

Dialysis Access :

CRRT

Types :

Total Duration :

Total UF :

Anti – Coagulation :

Type of Filter

Type of Membrane :

Machine Type/Model :

Staring Time : Started By:

LAB DATA'S

Data's	Hb	PCV	Glucose	BUN	Cr	Na	K	Ca	Mg	Po_4	Hco_3	PT	PTT

COMPLICATIONS DURING THERAPY

Complications :

Causes :

Termination Time :

Management :

Restarted Time :

THERAPY ENDING

Termination Time :

Termination By :

Reused/Discarded :

Reused By :

FBV :

Any other Information:

Prepared By Reported By Signature of Faculty

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Other Extracorporeal Procedures

Sr. No	Name	Date	Hospital No	Procedure	Indications	Complications during procedure	Signature

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NCAHP
Since-2021
स्वास्थ्य देखभाल पेशे

VerifiedBy :

Signature Of Faculty :

Transplant Coordination Checklist

Name:

Hospital No:

Please mention (✓) if Forms are submitted or mention (X)

Sr No	Form No	Description	Checklist
1	Form 1	FOR ORGAN OR TISSUE DONATION FROM IDENTIFIED LIVING NEAR RELATED DONOR	
2	Form 2	FOR ORGAN OR TISSUE DONATION BY LIVING SPOUSAL DONOR	
3	Form 3	FOR ORGAN OR TISSUE DONATION BY OTHER THAN NEAR RELATIVE LIVING DONOR	
4	Form 4	FOR CERTIFICATION OF MEDICAL FITNESS OF LIVING DONOR	
5	Form 5	FOR CERTIFICATION OF GENETIC RELATIONSHIP OF LIVING DONOR WITH RECIPIENT	
6	Form 6	FOR SPOUSAL LIVING DONOR	
7	Form 7	FOR ORGAN OR TISSUE PLEDGING	
8	Form 8	FOR DECLARATION CUM CONSENT	
9	Form 9	FOR UNCLAIMED BODY IN A HOSPITAL OR PRISON	
10	Form 10	FOR CERTIFICATION OF BRAIN STEM DEATH	
11	Form 11	APPLICATION FOR APPROVAL OF TRANSPLANTATION FROM LIVING DONOR	
12	Form 12	APPLICATION FOR REGISTRATION OF HOSPITAL TO CARRY OUT ORGAN OR TISSUE TRANSPLANTATION OTHER THAN CORNEA	
13	Form 13	APPLICATION FOR REGISTRATION OF HOSPITAL TO CARRY OUT ORGAN/TISSUE RETRIEVAL OTHER THAN EYE/CORNEA RETRIEVAL	
14	Form 14	APPLICATION FOR REGISTRATION OF TISSUE BANKS OTHER THAN EYE BANKS	
15	Form 15	APPLICATION FOR REGISTRATION OF EYE BANK, CORNEAL TRANSPLANTATION CENTRE, EYE RETRIEVAL CENTRE UNDER TRANSPLANTATION OF HUMAN ORGANS ACT	

16	Form 16	CERTIFICATE OF REGISTRATION FOR PERFORMING ORGAN/TISSUE TRANSPLANTATION/RETRIEVAL AND/OR TISSUE BANKING	
17	Form 17	CERTIFICATE OF RENEWAL OF REGISTRATION	
18	Form 18	CERTIFICATE BY THE AUTHORISATION COMMITTEE OF HOSPITAL (IF HOSPITAL AUTHORISATION COMMITTEE IS NOT AVAILABLE THEN THE AUTHORISATION COMMITTEE OF THE DISTRICT/STATE) WHERE THE TRANSPLANTATION HAS TO TAKE PLACE (TO BE ISSUED ON THE LETTER HEAD).	
19	Form 19	CERTIFICATE BY COMPETENT AUTHORITY [AS DEFINED AT RULE 2(C)] FOR INDIAN NEAR RELATIVE, OTHER THAN SPOUSE, CASES (IN CASE OF SPOUSAL DONOR, FORM 6 WILL BE APPLICABLE)	
20	Form 20	VERIFICATION CERTIFICATE IN RESPECT OF DOMICILE STATUS OF RECIPIENT OR DONOR [TO BE ISSUED BY TEHSILDAR OR ANY OTHER AUTHORISED OFFICER FOR THE PURPOSE (REQUIRED ONLY FOR THE DONOR - OTHER THAN NEAR RELATIVE OR RECIPIENT IF THEY DO NOT BELONG TO THE STATE WHERE TRANSPLANT HOSPITAL IDENTIFIED FOR OPERATION IS LOCATED)]	
21	Form 21	CERTIFICATE OF RELATIONSHIP BETWEEN DONOR AND RECIPIENT IN CASE OF FOREIGNERS (TO BE ISSUED BY THE EMBASSY CONCERNED)	

VerifiedBy : **Signature Of Faculty :**

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NCAHP
Since-2021
राष्ट्रीय सहबद्ध और स्वास्थ्य देखभाल व्यवसाय आयोग

AVF/AVG Creation & Transplantation

Sr. No	Name	Date	Hospital No	Procedure	Indications	Complications during procedure	Signature

NATIONAL COMMISSION FOR ALLIED HEALTHCARE PROFESSIONS
राष्ट्रीय सहयोगी एवं स्वास्थ्य देखभाल पेशेवर आयोग
NCAHP
Since-2021

VerifiedBy :

Signature Of Faculty :

PD Catheterization

Sr. No	Name	Date	Hospital No	Indications	Type of Catheter Used	Complications during procedure	Signature

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स्वास्थ्यम् सर्वार्थसाधनम्
NCAHP
Since-2021
राष्ट्रीय सहबद्ध और स्वास्थ्य देखभाल पेशे आयोग

Verified By: **Signature Of Faculty:**

Annex- 5

Bachelors in Dialysis Therapy Technology – Internship Log Book Format

Instructions

1. Following log book should be maintained for Internship.
2. Print out of the sheets may be depended on the no of cases/ clinical quota mentioned in chapter 4.
3. Certificate of the Log Book should be only signed after end of the year.
4. Log book needs to be checked & verified daily.
5. Posting Areas for Internship are as follows:
    a. Procedure Room- Renal Biopsy, Central Venous Catheterization, PD Catheterization
    b. Operation Theater- AVF/AVG Creation & Transplantation
    c. Transplant Coordination
    d. ICU Dialysis
    e. Dialysis Unit

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NCAHP
Since-2021
सहचर और स्वास्थ्य देखभाल पेशेवर आयोग

Bachelors in Dialysis Therapy Technology
Internship
Renal Biopsy

Sr. No	Name	Date	Hospital No	Indications	Complications during procedure	Signature

NATIONAL COMMISSION FOR ALLIED & HEALTHCARE PROFESSIONS
NICAHP
Since-2021

Verified By: **Signature Of Faculty:**

Central Venous Catheterization

Sr. No	Name	Date	Hospital No	Indications	Location of Catheterization	Complications during procedure	Signature

Verified By: **Signature Of Faculty:**

NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
स्वास्थ्यम् सर्वार्थसाधनम्
NCAHP
Since-2021
राष्ट्रीय गठबंधन और स्वास्थ्य देखभाल पेशेवर आयोग

PD Catheterization

Sr. No	Name	Date	Hospital No	Indications	Location of Catheterization	Complications during procedure	Signature

NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
स्वास्थ्य सर्वाधिसाधनम्
NCAHP
Since-2021
स्वास्थ्य और स्वास्थ्य देखभाल पेशेवर

Verified By: **Signature Of Faculty:**

AVF/AVG Creation & Transplantation

Sr. No	Name	Date	Hospital No	Procedure	Indications	Complications during procedure	Signature

VerifiedBy : **Signature Of Faculty :**

Transplant Coordination Checklist

Name:

Hospital No:

Please mention (✓) if Forms are submitted or mention (X)

Sr No	Form No	Description	Checklist
1	Form 1	FOR ORGAN OR TISSUE DONATION FROM IDENTIFIED LIVING NEAR RELATED DONOR	
2	Form 2	FOR ORGAN OR TISSUE DONATION BY LIVING SPOUSAL DONOR	
3	Form 3	FOR ORGAN OR TISSUE DONATION BY OTHER THAN NEAR RELATIVE LIVING DONOR	
4	Form 4	FOR CERTIFICATION OF MEDICAL FITNESS OF LIVING DONOR	
5	Form 5	FOR CERTIFICATION OF GENETIC RELATIONSHIP OF LIVING DONOR WITH RECIPIENT	
6	Form 6	FOR SPOUSAL LIVING DONOR	
7	Form 7	FOR ORGAN OR TISSUE PLEDGING	
8	Form 8	FOR DECLARATION CUM CONSENT	
9	Form 9	FOR UNCLAIMED BODY IN A HOSPITAL OR PRISON	
10	Form 10	FOR CERTIFICATION OF BRAIN STEM DEATH	
11	Form 11	APPLICATION FOR APPROVAL OF TRANSPLANTATION FROM LIVING DONOR	
12	Form 12	APPLICATION FOR REGISTRATION OF HOSPITAL TO CARRY OUT ORGAN OR TISSUE TRANSPLANTATION OTHER THAN CORNEA	
13	Form 13	APPLICATION FOR REGISTRATION OF HOSPITAL TO CARRY OUT ORGAN/TISSUE RETRIEVAL OTHER THAN EYE/CORNEA RETRIEVAL	
14	Form 14	APPLICATION FOR REGISTRATION OF TISSUE BANKS OTHER THAN EYE BANKS	
15	Form 15	APPLICATION FOR REGISTRATION OF EYE BANK, CORNEAL TRANSPLANTATION CENTRE, EYE RETRIEVAL CENTRE UNDER TRANSPLANTATION OF HUMAN ORGANS ACT	

16	Form 16	CERTIFICATE OF REGISTRATION FOR PERFORMING ORGAN/TISSUE TRANSPLANTATION/RETRIEVAL AND/OR TISSUE BANKING	
17	Form 17	CERTIFICATE OF RENEWAL OF REGISTRATION	
18	Form 18	CERTIFICATE BY THE AUTHORISATION COMMITTEE OF HOSPITAL (IF HOSPITAL AUTHORISATION COMMITTEE IS NOT AVAILABLE THEN THE AUTHORISATION COMMITTEE OF THE DISTRICT/STATE) WHERE THE TRANSPLANTATION HAS TO TAKE PLACE (TO BE ISSUED ON THE LETTER HEAD).	
19	Form 19	CERTIFICATE BY COMPETENT AUTHORITY [AS DEFINED AT RULE 2(C)] FOR INDIAN NEAR RELATIVE,OTHER THAN SPOUSE, CASES (IN CASE OF SPOUSAL DONOR, FORM 6 WILL BE APPLICABLE)	
20	Form 20	VERIFICATION CERTIFICATE IN RESPECT OF DOMICILE STATUS OF RECIPIENT OR DONOR [TO BE ISSUED BY TEHSILDAR OR ANY OTHER AUTHORISED OFFICER FOR THE PURPOSE (REQUIRED ONLY FOR THE DONOR - OTHER THAN NEAR RELATIVE OR RECIPIENT IF THEY DO NOT BELONG TO THE STATE WHERE TRANSPLANT HOSPITAL IDENTIFIED FOR OPERATION IS LOCATED)]	
21	Form 21	CERTIFICATE OF RELATIONSHIP BETWEEN DONOR AND RECIPIENT IN CASE OF FOREIGNERS (TO BE ISSUED BY THE EMBASSY CONCERNED)	

VerifiedBy : **Signature Of Faculty :**

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RENAL REPLACEMENT THERAPY ASSESSMENT SHEET

PATIENT DATA

Patient Name :

Age/Sex :

Hosp:No :

Diagnosis :

Reasons for CRRT :

Viral Status :

Dialysis Access

CRRT

Types :

Total Duration :

Total UF :

Anti – Coagulation :

Type of Filter :

Type of Membrane

Machine Type/Model :

Staring Time : Started By:

LAB DATA'S

Data's	Hb	PCV	Glucose	BUN	Cr	Na	K	Ca	Mg	Po_4	Hco_3	PT	PTT

COMPLICATIONS DURING THERAPY

Complications :

Causes :

Termination Time :

Management :

Restarted Time :

Any other Information:

THERAPY ENDING

Termination Time :

Termination By :

Reused/Discarded :

Reused By :

EBV

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TIME													12 hrs total												12 hrs total
B.P																									
Pulse																									
CVP																									
BFR																									
DFR																									
VP																									
TMP																									
AP																									
Anti-coagulation ( )																									
Effluent (Total of all fluids)																									
Replacement F																									
Dialysate Infused																									
Patient Fluid Removal(UF)																									
Additional Output(urine,chest pain,NG,drain)																									
Total Output																									
All Intake: IV,OP,etc -Except Replacement																									
Hourly Fluid Balance																									
Desired outcome																									
Patient fluid replacement given																									
Effluent Pressure																									
Remarks																									

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Prepared By Reported By Signature of Faculty

PREVIOUS HISTORY OF INFECTION/TREATMENT DONE:

TOTAL EPISODES/TYPE OF INFECTION: ORGANISMS INVOLVED:

PRESENT PD PRESCRIPTION:

% OF BAG	NO.OF.EXCHANGE	VOLUME	URINE OUTPUT

PLAN:

BLOOD INVESTIGATION:
CULTURE: URINE

PUS CULTURE:

INFECTION TYPE:

EMPIRICAL TREATMENT:

ANTIBIOTICS GIVEN:

NO.OF.DAYS:

TREAMENT PRIOR TO CULTURE REPORT:

ORGANISM: ANTIBIOTIC SENSITIVITY:

TC: DC:

ANTIBIOTICS:

DOSAGE: NO.OF.DAYS:

OTHERS:

TRANSPLANT COUNSELLING: PATIENT EDUCATION:

NUTRITIONAL EDUCATION: FOLLOW UP DATE:

COMMENTS:

PREPARED BY: **REPORTED BY:** **SIGNATURE OF FACULTY**

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RENAL REPLACEMENT THERAPY ASSESSMENT SHEET

PATIENT DATA

Patient Name :

Age/Sex :

Hosp:No :

Diagnosis :

Reasons for CRRT :

Viral Status :

Dialysis Access

CRRT

Types :

Total Duration :

Total UF :

Anti – Coagulation :

Type of Filter :

Type of Membrane

Machine Type/Model :

Staring Time : Started By:

LAB DATA'S

Data's	Hb	PCV	Glucose	BUN	Cr	Na	K	Ca	Mg	Po_4	Hco_3	PT	PTT

COMPLICATIONS DURING THERAPY

Complications :

Causes :

Termination Time :

Management :

Restarted Time :

Any other Information:

THERAPY ENDING

Termination Time :

Termination By :

Reused/Discarded :

Reused By :

EBV

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और स्वास्थ्य देखभाल पेशेवर आयोग

TIME												12 hrs total												12 hrs total
B.P																								
Pulse																								
CVP																								
BFR																								
DFR																								
VP																								
TMP																								
AP																								
Anti-coagulation ( )																								
Effluent (Total of all fluids)																								
Replacement F																								
Dialysate Infused																								
Patient Fluid Removal(UF)																								
Additional Output(urine,chest pain,NG,drain)																								
Total Output																								
All Intake: IV,OP,etc Except Replacement																								
Hourly Fluid Balance																								
Desired outcome																								
Patient fluid replacement given																								
Effluent Pressure																								
Remarks																								

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Other Extracorporeal Procedures

Sr. No	Name	Date	Hospital No	Procedure	Indications	Complications during procedure	Signature

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VerifiedBy :

Signature Of Faculty :

PD CASE RECORD

NAME: HOSP.NO/OP.NO:

AGE/SEX: ADDRESS:

HT: WT: BMI: BSA:

CONTACT NO: CONSULTANT:

DOA: DOD:

ANTHROPOMETRIC ASSESMENT:

TSF: MAC: MAMC:

REASON FOR ADMISSION: PREVIOUS DATE OF VISIT:

PRIMARY DIAGNOSIS: VIRAL STATUS:

COMORBID CONDITION:

PATIENT COMPLAINT OF:

STATUS: DM/Yrs: HTN/Yrs: CAD/Yrs: VACCINATION:

PREVIOUS SURGERY UNDERGONE: YES/NO BLOOD GROUP:

NAME/DATE OF THE SURGERY DONE:

DATE OF PD CATHETERISATION:

TYPE OF CATHETER/SIZE:

DATE OF SUTURE REMOVAL:

FLUSHING DATES:

LOW SUPINE PD: YES/NO REASON FOR PD:

EXCHANGES STARTED ON:

PERCENTAGE/EXCHANGES/VOLUME:

UNDERGONE HEMODIALYSIS: YES/NO DURATION OF HD:

HD ACCESS:

PET: DATE:

ADEQUACY: DATE:

CREATININE CLEARANCE: DATE:

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PREVIOUS HISTORY OF INFECTION/TREATMENT DONE:

TOTAL EPISODES/TYPE OF INFECTION: ORGANISMS INVOLVED:

PRESENT PD PRESCRIPTION:

% OF BAG	NO.OF.EXCHANGE	VOLUME	URINE OUTPUT

PLAN:

BLOOD INVESTIGATION: URINE CULTURE:

PUS CULTURE: INFECTION TYPE:

EMPIRICAL TREATMENT:

ANTIBIOTICS GIVEN:

NO.OF.DAYS:

TREAMENT PRIOR TO CULTURE REPORT:

ORGANISM: ANTIBIOTIC SENSITIVITY:

TC: DC:

ANTIBIOTICS:

DOSAGE: NO.OF.DAYS:

OTHERS:

TRANSPLANT COUNSELLING: PATIENT EDUCATION:

NUTRITIONAL EDUCATION: FOLLOW UP DATE:

COMMENTS:

PREPARED BY: **REPORTED BY:** **SIGNATURE OF FACULTY**

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PD DAILY RECORD SHEET

NAME: HOSP.NO/OP.NO:

DATE:

PD EXCHANGE DETAILS: PRE WEIGHT: POST WEIGHT:

NO	DEX %	PRE BP	POST BP	INPUT	OUTPUT	DWELL TIME	UF	CUF	REMARKS
1									
2									
3									
4									
5									

ANTIBIOTICS GIVEN: DOSAGE: NO.OF DAY:

FLID INTAKE: URINE OUTPUT:

NET UF:

PATIENT COMPLAINTS:

EXIT SITE DRESSING: EXIT SITE SCORE:

EXIT SITE APPERANCE:

SWELLING: CRUST: REDNESS: PAIN: DRAINAGE:

INVESTIGATIONS:

1. SERUM ANALYSIS:

HB ___ PCV ___ TC ___ DC ___ BUN ___ CREAT ___ K^+ ___
Na^{2+} ___ Hco_3 ___ URIC ACID ___ ALBUMIN ___ T.PROTEIN ___

2. PD FLUID ANALYSIS:

TC ___ DC ___ AFB ___ TB PCR ___

FUNGAL SMEAR ___ GRAM STAIN ___

ORGANISM GROWTH: ANTIBIOTIC SENSITIVITY:

MEDICATIONS:

PREPARED BY: **VERIFIEDBY:** **SIGNATURE OF FACULTY:**

HEMODIALYSIS RECORD SHEET

Name: Age & Sex: Date: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:
Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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HEMODIALYSIS CIRCUIT PREPARATION

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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INITIATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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स्वास्थ्य, सर्वोत्तम संरक्षण
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TERMINATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

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Annex- 6

Masters in Dialysis Therapy Log Book
Instructions

1. Following log book should be maintained for all four Semester.
2. Print out of the sheets may be depended on the no of cases/ clinical quota mentioned in chapter 4.
3. Certificate of the Log Book should be only signed after end of each year.
4. Log book has been divided into two sections. One section for each year.
5. Log book needs to be checked & verified daily.
6. Posting Areas for Each Semesters:

Section	Semester	Posting Area
Section 1	Semester 1 & Semester 2	Nephrology OPD, Nephrology Ward, Hemodialysis Unit, Procedure Room, Operation Theater, ICU
Section 2	Semester 3 & Semester 4	Nephrology OPD, Nephrology Ward, Hemodialysis Unit, Procedure Room, Operation Theater, ICU

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Section 1: Masters in Dialysis Therapy
Semester 1 & Semester 2

OPD RECORD SHEET

Name: Date:

Hosp No: Age & Sex Ht: Wt:

Blood Group: BMI: BSA:

Major Complaints: Biochemical Test:

History: Pathological Test:

Microbiological Test:

Diagnosis: Treatment/ Medications:

Advice:

Next Follow Up:

Verified By : Signature Of Faculty:

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NEPHROLOGY WARD RECORD SHEET

Name:			Date:
Hosp No:	Age & Sex	Ht:	Wt:
Blood Group:		BMI:	BSA:
Major Complains:		Biochemical Test:	
History:		Pathological Test:	
		Microbiological Test:	
Diagnosis:		Treatment/ Medications:	
Fluid Intake:		Fluid Output:	

Vitals

BP:	Pulse:	SPO_2:
Temperature:		

Verified By: Signature Of Faculty:

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RENAL BIOPSY WORKUP SHEET

Name:			Date:
Hosp No:	Age & Sex	Ht:	Wt:
Blood Group:		BMI:	BSA:
Major Complains:		Biochemical Test:	
History:		Pathological Test:	
		Microbiological Test:	
Diagnosis:		Treatment/ Medications:	
Imaging Scans:			

Vitals

BP:	Pulse:	SPO_2:
Per Biopsy	Per Biopsy	Per Biopsy
Post Biopsy	Post Biopsy	Post Biopsy
Temperature:		Complication
Per Biopsy		
Post Biopsy		

Biopsy Results (Attach Slide Image)

Interpretation of Biopsy Result

Verified By:

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Renal Biopsy

Sr. No	Name	Date	Hospital No	Indications	Complications during procedure	Signature

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Central Venous Catheterization

Sr. No	Name	Date	Hospital No	Indications	Location of Catheterization	Complications during procedure	Signature

Verified By: **Signature Of Faculty:**

HEMODIALYSIS RECORD SHEET

Date:

Name: Age & Sex: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:
Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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HEMODIALYSIS CIRCUIT PREPARATION

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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INITIATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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Signature Of Faculty :

TERMINATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

Verified By : **Signature Of Faculty :**

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PD CASE RECORD

NAME:

HOSP.NO/OP.NO:

AGE/SEX:

ADDRESS:

HT: WT:

BMI: BSA:

CONTACT NO:

CONSULTANT:

DOA:

DOD:

ANTHROPOMETRIC ASSESMENT:

TSF: MAC: MAMC:

REASON FOR ADMISSION:

PREVIOUS/DATE OF VISIT:

PRIMARY DIAGNOSIS:

VIRAL STATUS:

COMORBID CONDITION:

PATIENT COMPLAINT OF:

STATUS: DM/Yrs: HTN/Yrs: CAD/Yrs:

VACCINATION:

PREVIOUS SURGERY UNDERGONE: YES/NO

BLOOD GROUP:

NAME/DATE OF THE SURGERY DONE:

DATE OF PD CATHETERISATION:

TYPE OF CATHETER/SIZE:

DATE OF SUTURE REMOVAL:

FLUSHING DATES:

LOW SUPINE PD: YES/NO

REASON FOR PD:

EXCHANGES STARTED ON:

PERCENTAGE/EXCHANGES/VOLUME:

UNDERGONE HEMODIALYSIS: YES/NO

DURATION OF HD:

HD ACCESS:

PET:

DATE:

ADEQUACY:

DATE:

CREATININE CLEARANCE:

DATE:

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PREVIOUS HISTORY OF INFECTION/TREATMENT DONE:

TOTAL EPISODES/TYPE OF INFECTION: ORGANISMS INVOLVED:

PRESENT PD PRESCRIPTION:

% OF BAG	NO.OF.EXCHANGE	VOLUME	URINE OUTPUT

PLAN:

BLOOD INVESTIGATION: URINE CULTURE:

PUS CULTURE: INFECTION TYPE:

EMPIRICAL TREATMENT:

ANTIBIOTICS GIVEN:

NO.OF.DAYS:

TREAMENT PRIOR TO CULTURE REPORT:

ORGANISM: ANTIBIOTIC SENSITIVITY:

TC: DC:

ANTIBIOTICS:

DOSAGE: NO.OF.DAYS:

OTHERS:

TRANSPLANT COUNSELLING: PATIENT EDUCATION:

NUTRITIONAL EDUCATION: FOLLOW UP DATE:

COMMENTS:

PREPARED BY: **REPORTED BY:** **SIGNATURE OF FACULTY INCHARGE**

PD DAILY RECORD SHEET

NAME: HOSP.NO/OP.NO:

DATE:

PD EXCHANGE DETAILS: PRE WEIGHT: POST WEIGHT:

NO	DEX %	PRE BP	POST BP	INPUT	OUTPUT	DWELL TIME	UF	CUF	REMARKS
1									
2									
3									
4									
5									

ANTIBIOTICS GIVEN: DOSAGE: NO.OF DAY:

FLID INTAKE: URINE OUTPUT:

NET UF:

PATIENT COMPLAINTS:

EXIT SITE DRESSING: EXIT SITE SCORE:

EXIT SITE APPERANCE:

SWELLING: CRUST: REDNESS: PAIN: DRAINAGE:

INVESTIGATIONS:

1. SERUM ANALYSIS:

HB ____ PCV ____ TC ____ DC _____ BUN ____ CREAT ____ K^+____
Na^{2+}____ Hco_3____ URIC ACID ____ ALBUMIN ____ T.PROTEIN ____

2. PD FLUID ANALYSIS:

TC ____ DC _____ AFB _____ TB PCR _____

FUNGAL SMEAR _____ GRAM STAIN _____

ORGANISM GROWTH: ANTIBIOTIC SENSITIVITY:

MEDICATIONS:

PREPARED BY: **VERIFIEDBY:** **SIGNATURE OF FACULTY:**

CONTINUOUS RENAL REPLACEMENT THERAPY ASSESSMENT SHEET

PATIENT DATA

Patient Name :

Age/Sex :

Hosp:No :

Diagnosis :

Reasons for CRRT :

Viral Status :

Dialysis Access :

Staring Time :

CRRT

Types :

Total Duration :

Total UF :

Anti – Coagulation :

Type of Filter :

Type of Membrane :

Machine Type/Model :

Started By:

LAB DATA'S

Data's	Hb	PCV	Glucose	BUN	Cr	Na	K	Ca	Mg	Po_4	Hco_3	PT	PTT

COMPLICATIONS DURING THERAPY

Complications :

Causes :

Termination Time :

Management :

Restarted Time :

Any other Information:

THERAPY ENDING

Termination Time :

Termination By :

Reused/Discarded :

Reused By :

FBV :

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Other Extracorporeal Procedures

Sr. No	Name	Date	Hospital No	Procedure	Indications	Complications during procedure	Signature

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VerifiedBy : **Signature Of Faculty :**

Transplant Coordination Checklist

Name:

Hospital No:

Please mention (✓) if Forms are submitted or mention (X)

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VerifiedBy : **Signature Of Faculty :**

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PD Catheterization

St. No	Name	Date	Hospital No	Indications	Type of Catheter Used	Complications during procedure	Signature

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Section 2: Masters in Dialysis Therapy
Semester 3 & Semester 4

OPD RECORD SHEET

Name: Date:

Hosp No: Age & Sex Ht: Wt:

Blood Group: BMI: BSA:

Major Complains: Biochemical Test:

History: Pathological Test:

Microbiological Test:

Diagnosis: Treatment/ Medications:

Advice:

Next Follow Up:

Verified By: Signature Of Faculty:

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NEPHROLOGY WARD RECORD SHEET

Name:			Date:
Hosp No:	Age & Sex	Ht:	Wt:
Blood Group:		BMI:	BSA:
Major Complains:		Biochemical Test:	
History:		Pathological Test:	
		Microbiological Test:	
Diagnosis:		Treatment/ Medications:	
Fluid Intake:		Fluid Output:	

Vitals

BP:	Pulse:	SPO_2:

Temperature:

Verified By:

Signature Of Faculty:

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RENAL BIOPSY WORKUP SHEET

Name: Date:

Hosp No: Age & Sex Ht: Wt:

Blood Group: BMI: BSA:

Major Complains: Biochemical Test:

History: Pathological Test:

Microbiological Test:

Diagnosis: Treatment/ Medications:

Imaging Scans:

Vitals

BP: Pulse: SPO_2:
Per Biopsy Per Biopsy Per Biopsy
Post Biopsy Post Biopsy Post Biopsy

Temperature: Complication
Per Biopsy
Post Biopsy

Biopsy Results (Attach Slide Image) Interpretation of Biopsy Result

Verified By: Signature Of Faculty:

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Renal Biopsy

Sr. No	Name	Date	Hospital No	Indications	Complications during procedure	Signature

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Central Venous Catheterization

Sr. No	Name	Date	Hospital No	Indications	Location of Catheterization	Complications during procedure	Signature

Verified By: **Signature Of Faculty:**

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HEMODIALYSIS RECORD SHEET

Date:

Name: Age & Sex: Op. No/ Hosp No:

Blood group: Ht: Wt: BSA:

Basic kidney Disease: BMI:

Co morbid conditions: Viral Status:

Urine Output: Frequency of dialysis: Access - AVF Date
CVC Date
Dry Weight: AVG Date

Vaccination Status:
Ongoing Therapy

Start date	Medications	Dosage	Route	Freq	Indication

INVESTIGATIONS

Date		Remarks	Date		Remarks
Hemoglobin			Calcium		
PCV			Phosphorus		
Sr. Ferritin			Uric acid		
Sr Iron			SGOT		
Sr. TIBC			SGPT		
TSAT			SAP		
Bun			T.Protein		
Sr. Creatinine			Sr.Albumin		
Sodium			iPTH		
Potassium			Vit D3		

VIRAL SEROLOGY SCREENING TEST

Date	
Hbs Ag	
Anti HCV	
HIV	
Anti HBS	

Date		
KT/V		
URR		

Intra dialytic problems if any-

Dialysate:
Dialyser: Surface area:
Hours of Dialysis:
Heparin:
Last Ideal wt refixed on:
Access Dressing Done:

St Connection/ Saline drain:
Ultrafiltration:
Expected weight loss:
Ideal weight:
Date of previous Access Dressing (CVC):

Blood access:	Jugular/Femoral/ Sub clavian catheter A.V Fistula / Graft/perm catheter
Total No of Dialysis:	Dialyser reuse number:
Weight before Dialysis:	
Weight gain:	

Time	BP mm Hg	Pulse/min	Heparin Units/hr	BFR ml/min	VP mm Hg	Net UF	TMP mm Hg	Remarks

Post Dialysis Assessment

Post dialysis weight	Weight Loss
Post dialysis BP	

Work Done:

Any other Information:

Verified By: Signature of Faculty

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HEMODIALYSIS CIRCUIT PREPARATION

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

Verified By : **Signature Of Faculty :**

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INITIATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

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Verified By :

Signature Of Faculty :

TERMINATION OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	S.NO	DATE	PT NAME	SIGNATURE

Verified By : **Signature Of Faculty :**

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REPROCESSING OF HEMODIALYSIS

S.NO	DATE	PT NAME	SIGNATURE	FBV	S.NO	DATE	PT NAME	SIGNATURE	FBV

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WATER TREATMENT PLANT MAINTANANCE

S.NO	DATE	INLET PRESSURE	RO PRESSURE	CONDUCTIVITY	TDS	pH	HARDNESS

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Verified By :

Signature Of Faculty :

PD CASE RECORD

NAME:

HOSP.NO/OP.NO:

AGE/SEX:

ADDRESS:

HT: WT:

BMI: BSA:

CONTACT NO:

CONSULTANT:

DOA:

DOD:

ANTHROPOMETRIC ASSESMENT:

TSF: MAC: MAMC:

REASON FOR ADMISSION:

PREVIOUS DATE OF VISIT:

PRIMARY DIAGNOSIS:

VIRAL STATUS:

COMORBID CONDITION:

PATIENT COMPLAINT OF:

STATUS: DM/Yes: HTN/Yes: CAD/Yes:

VACCINATION:

PREVIOUS SURGERY UNDERGONE: YES/NO

BLOOD GROUP:

NAME/DATE OF THE SURGERY DONE:

DATE OF PD CATHETERISATION:

TYPE OF CATHETER/SIZE:

DATE OF SUTURE REMOVAL:

FLUSHING DATES:

LOW SUPINE PD: YES/NO

REASON FOR PD:

EXCHANGES STARTED ON:

PERCENTAGE/EXCHANGES/VOLUME:

UNDERGONE HEMODIALYSIS: YES/NO

DURATION OF HD:

HD ACCESS:

PET:

DATE:

ADEQUACY:

DATE:

CREATININE CLEARANCE:

DATE:

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PREVIOUS HISTORY OF INFECTION/TREATMENT DONE:

TOTAL EPISODES/TYPE OF INFECTION: ORGANISMS INVOLVED:

PRESENT PD PRESCRIPTION:

% OF BAG	NO.OF.EXCHANGE	VOLUME	URINE OUTPUT

PLAN:

BLOOD INVESTIGATION: URINE CULTURE:

PUS CULTURE: INFECTION TYPE:

EMPIRICAL TREATMENT:

ANTIBIOTICS GIVEN:

NO.OF.DAYS:

TREAMENT PRIOR TO CULTURE REPORT:

ORGANISM: ANTIBIOTIC SENSITIVITY:

TC: DC:

ANTIBIOTICS:

DOSAGE: NO.OF.DAYS:

OTHERS:

TRANSPLANT COUNSELLING: PATIENT EDUCATION:

NUTRITIONAL EDUCATION: FOLLOW UP DATE:

COMMENTS:

PREPARED BY: **REPORTED BY:** **SIGNATURE OF FACULTY INCHARGE**

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PD DAILY RECORD SHEET

NAME: HOSP.NO/OP.NO:

DATE:

PD EXCHANGE DETAILS: PRE WEIGHT: POST WEIGHT:

NO	DEX %	PRE BP	POST BP	INPUT	OUTPUT	DWELL TIME	UF	CUF	REMARKS
1									
2									
3									
4									
5									

ANTIBIOTICS GIVEN: DOSAGE: NO.OF DAY:

FLID INTAKE: URINE OUTPUT:

NET UF:

PATIENT COMPLAINTS:

EXIT SITE DRESSING: EXIT SITE SCORE:

EXIT SITE APPERANCE:

SWELLING: CRUST: REDNESS: PAIN: DRAINAGE:

INVESTIGATIONS:

1. SERUM ANALYSIS:

HB ___ PCV ___ TC ___ DC ___ BUN ___ CREAT ___ K ___
Na^{2+} ___ Hco_3 ___ URIC ACID ___ ALBUMIN ___ T.PROTEIN ___

2. PD FLUID ANALYSIS:

TC ___ DC ___ AFB ___ TB PCR ___

FUNGAL SMEAR ___ GRAM STAIN ___

ORGANISM GROWTH: ANTIBIOTIC SENSITIVITY:

MEDICATIONS:

PREPARED BY: **VERIFIEDBY:** **SIGNATURE OF FACULTY:**

CONTINUOUS RENAL REPLACEMENT THERAPY ASSESSMENT SHEET

PATIENT DATA

Patient Name :

Age/Sex :

Hosp:No :

Diagnosis :

Reasons for CRRT :

Viral Status :

Dialysis Access :

CRRT

Types :

Total Duration :

Total UF :

Anti – Coagulation :

Type of Filter :

Type of Membrane :

Machine Type/Model :

Staring Time : Started By:

LAB DATA'S

Data's	Hb	PCV	Glucose	BUN	Cr	Na	K	Ca	Mg	Po_4	Hco_3	PT	PTT

COMPLICATIONS DURING THERAPY

Complications :

Causes :

Termination Time :

Management :

Restarted Time :

THERAPY ENDING

Termination Time :

Termination By :

Reused/Discarded :

Reused By :

FBV :

Any other Information:

Prepared By Reported By Signature of Faculty

Other Extracorporeal Procedures

Sr. No	Name	Date	Hospital No	Procedure	Indications	Complications during procedure	Signature

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VerifiedBy : **Signature Of Faculty :**

Transplant Coordination Checklist

Name:

Hospital No:

Please mention (✓) if Forms are submitted or mention (X)

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PD Catheterization

Sr. No	Name	Date	Hospital No	Indications	Type of Catheter Used	Complications during procedure	Signature

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