

SUMANDEEP VIDYAPEETH

(Declared as Deemed to be University under Section 3 of the UGC Act 1956)

Accredited by NAAC with a CGPA of 3.53 out of four-point scale at 'A' Grade

Category – I deemed to be university under UGC Act - 2018

At & Post Piparia, Tal: Waghodia 391760 (Gujarat) India.

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CURRICULUM

Diploma in MEDICAL LABORATORY TECHNOLOGY

Attested CTC

Sharaney
15/2/2021

Vice-Chancellor
Sumandeep Vidyapeeth
An Institution Deemed to be University
VIII, Piparia, Taluka: Waghodia,
Dist. Vadodara-391 760. (Gujarat)

Polwade



Sharaney



AMENDED UP TO DECEMBER -2020

INTRODUCTION

Scope

The quality of paramedical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses. Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that paramedical and healthcare professionals are vital to successful treatment delivery.

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of health personnel, and their capacity to function as an integrated team, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. All of them are first-contact practitioners and work across a wide range of locations and sectors within acute, primary and community care.

Learning goals and objectives for paramedical healthcare professionals

The learning goals and objectives of the undergraduate and graduate education program will be based on the performance expectations. They will be articulated as learning goals (why we teach this) and learning objectives (what the students will learn). Using the framework, students will learn to integrate their knowledge, skills and abilities in a hands-on manner in a professional healthcare setting. These learning goals are divided into nine key areas, though the degree of required involvement may differ across various levels of qualification and professional cadres.

Program outcomes

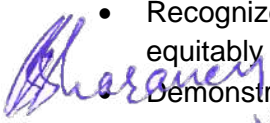
The course provides learning in the prevention, diagnosis, and treatment of diseases in patients through clinical laboratory tests. After successfully completing this course, candidates can perform activities such as analysing human body fluids, assisting the concerned doctor in the treatment of diseases and detecting the presence or absence of certain microorganisms in the patient's body.

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

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- 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

Commitment to professional excellence

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.

Eligibility for admission

Candidate should have passed 10 + 2 with science (PCB)

Duration of the course

Duration of the course is 2 year and 1 Year internship

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. 75% 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: Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated. Student must attain at least 50% marks in each Theory, Internal assessment and Practical independently / separately for each individual subject.

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Course of Instruction:

Course Name	Course Code	Theory (In hrs.) (Class and lab)	Practical (In hrs.) (Clinical)
First Year - Total Hours 480			
Anatomy	DMLT101	80	40
Physiology	DMLT102	80	40
Biochemistry	DMLT103	80	40
Pathology & Microbiology	DMLT104	80	40
		320	160
Second Year - Total Hours 480			
Biochemistry	DMLT201	100	60
Pathology	DMLT202	100	60
Microbiology	DMLT203	100	60
		300	180
Third Year -Total Hours 1000			
Internship (Integrated Practice)			1000

Scheme of Examination:

Course	Course Code	Assessment			
		Hours	Internal	External	Total
First Year					
Anatomy	DMLT101	3	20	80	100
Physiology	DMLT102	3	20	80	100
Biochemistry	DMLT103	3	20	80	100
Pathology & Microbiology	DMLT104	3	20	80	100
Total			60	320	400
Second Year					
Biochemistry	DMLT201	3	20	80	100
Pathology	DMLT202	3	20	80	100
Microbiology	DMLT203	3	20	80	100
Total			60	240	300

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FIRST YEAR MEDICAL LABORATORY TECHNOLOGY

DMLT101-ANATOMY

(80 HOURS)

Unit 1 – Organization

- Terms, terminology, planes
- Tissues of the body (General) Epithelial tissue
- Glands, mucous membrane.

Unit 2- Skeletal system

- Cartilage
- Bones
- Ossification, blood supply
- Joints
- Synovial joint

Unit 3- Muscular tissue

- Muscle classification – I
- Muscle – II

Unit 4- Nervous system)

- Neuron, Neuroglia
- Spinal cord & Spinal nerves
- Parts of brain & major functions
- Cranial nerves
- Autonomic nervous system

Unit 5- Sensory organs

- Nose & Olfaction
- Tongue

Unit 6- Circulation & Lymphatic

- Systemic, Pulmonary, Portal
- Heart, chambers, valves
- Coronary circulation, Venous drainage, applied
- Major branches of aorta, major veins, pulse
- Femoral and Axillary artery
- Diaphragm
- Lymphoid tissue classification, structure I
- Lymphoid tissue classification, structure II
- Lymphatic drainage, lymphatic trunks

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Unit 7- Respiratory system

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- Larynx, Trachea
- Pleura & lung & structure
- Bronchopulmonary segments, Para nasal sinuses

Unit 8 - Digestive system

- Pharynx, esophagus
- Stomach, Duodenum
- Liver, Gall bladder, Pancreas
- Jejunum, Ileum, Appendix
- Colon, Rectum, Anal canal

Unit 9 - (Urinary system)

- Kidney
- Ureter, Urinary bladder
- Prostate, Urethra

Unit 10 - Endocrine system

- Thyroid, Parathyroid
- Suprarenal
- Pituitary Pancreas,

Unit 11- Reproductive system

- Female reproductive system
- Male reproductive system

PRACTICALS:

(40 HOURS)

- Human skeleton
- Organ systems
- Organs – 1
- Organs – 2
- Organs – 3
- Organs – 4
- Organs – 5
- Types of Cartilages
- Bones -1
- Bones -2
- Bones -3
- Histology of compact bones
- Muscles of body as functional groups
- Histology of types of muscles

DMLT102 PHYSIOLOGY

(80 HOURS)

Unit 1- General Physiology

- Introduction to cell physiology,
- transport across cell membrane
- Homeostasis, Body Fluid compartment & measurement

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Unit 2 - Blood

- Introduction - composition and function of blood
- Plasma proteins
- Red blood cells.
- Haemoglobin
- WBC
- Platelets
- Homeostasis
- Blood Group

Unit 3 - Nerve - Muscle Physiology

- Resting membrane potential & Action potential
- Types of muscle & Mechanism of Muscle Contraction
- Neuromuscular Junction
- Neuron and neuroglia
- Properties of nerve fibre
- Secretion & Composition & function of CSF

Unit 4 - GIT

- Movement of GIT
- Deglutition & Mechanism of Vomiting
- Digestive Juices in upper digestive tract
- Digestive juices in lower digestive tract

Unit 5 - Excretory system

- Kidneys-structure, function
- Glomerular filtration rate
- Counter current mechanism of concentration of urine,
- micturition, Diuretics
- Artificial kidney, renal function tests
- Skin
- Regulation of body Temperature

Unit 6 - Respiratory system

- Mechanism of Breathing
- Hypoxia
- O₂ and CO₂ transport
- Pulmonary volume & Capacities

Unit 7 - Cardio Vascular System

- Introduction to CVS & general principles of circulation
- Properties of Cardiac muscle
- Cardiac cycle, heart sounds, Pulse

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- Cardiac output, Heart rate ,BP ,ECG
- Coronary circulation, Cutaneous Circulation-Triple response ,Shock
- Effects of exercise on CVS and Respiratory system

Unit 8 - Lymphatic System

Unit 9 - Endocrine System

- Hormones of pituitary, Thyroid
- Parathyroid Gland
- Hormones of Adrenal Gland & Pancreas

Unit 10 - Reproductive System

- Introduction to reproductive system, Puberty
- Male reproductive system,
- Female reproductive system,
- Physiological changes during pregnancy, pregnancy tests, parturition & lactation
- Male & Female contraceptive methods
- Special senses
- Vision
- Audition
- Olfaction
- Gustation

PRACTICALS:

(40 HOURS)

- Introduction and Laboratory guidelines
- Demonstration of estimation of Hemoglobin
- Practical of estimation of Hemoglobin
- Practical of BT & CT
- Practical of Blood Grouping
- ESR & PCV
- Blood Pressure
- Pulse
- Revision
- Heart rate & heart sound
- Breathing rate & breathing sound
- Identification of blood cells by peripheral smear. RBC, WBC, Platelets.
- Revisions

DMLT 103 – BIOCHEMISTRY

(80 HOURS)

- Basic concepts of Chemistry
- Structure of an Atom
- Elementary knowledge of inorganic chemistry: - Atomic weight, molecular weight, equivalent weight, acid, bases.
- Elementary knowledge of Organic chemistry: - Organic compounds, Aliphatic and Aromatic, Alcohols, Aldehydes, Ketones, Amines, Esters, Phenol.

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- State of matter: - bonds and forces.
- Hydrocarbon and important elements.
- Thermochemistry
- Redox Reaction and PH
- Preparation of solutions: - Percent solution, Molar solution, Normal solution and Buffer Solution.
- Units and measurement.

PRACTICALS:

(40 HOURS)

- Chemical laboratory orientation.
- Introduction and uses various Glassware.
- Introduction and uses of Instruments
- Preparation Solution and reagents.
- Acid base titration.
- pH Meter

DMLT104 - PATHOLOGY& MICROBIOLOGY

(80 HOURS)

PATHOLOGY (40 HOURS)

Unit 1 -The Cell in health and disease

- Introduction of pathology
- Cellular structure and metabolism
- Inflammation – Acute and Chronic
- Derangement of Body Fluids and Electrolytes
- Types of shocks
- Ischemia
- Infection
- Neoplasia – Etiology and Pathogenesis

Unit 2-Introduction of haematology

- Formation of Blood
- Erythropoiesis
- Leucopoiesis
- Thrombopoiesis
- Collection of Blood
- Anticoagulants
- Red cell count – Haemocytometer, Methods and Calculation
- WBC Count – Methods
- Differential Leucocytes Count (DLC) – Morphology of White Cells, Normal Values Rananocostry Stains : Staining procedures Counting Methods, Principle of staining
- Hb estimation - Method
Colorimetric Method Chemical

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Unit 3 - Haematology :

- ESR
- Methods
- Factors – Affecting ESR
- Normal Values
- Importance
- RBC – Indices
- Platelets

Unit IV : Body Fluids :

- Urine :
- Method of Collection
- Normal Constituent
- Physical Examination
- Chemical Examination
- Stool Examination :
- Method of Collection
- Normal Constituents and appearance
- Abnormal Constituents (Ova, Cyst)
- C.S.F. Examination
- Physical Examination
- Chemical Examination
- Microscopy
- Cell Count
- Staining
- Semen Analysis
- Collection
- Examination
- Special Tests

PRACTICAL :

(40 HOURS)

- Urine, Stool, Semen and C.S.F. – Collection, Handling, Examinations
- Absolute Eosinophil Count, PCV, RBC indices, ESR Estimation, Platelets Count

MICROBIOLOGY (40 HOURS)

Unit 1: General Microbiology

- History: Louis Pasteur, Robert Koch
- Microscope: Parts, function and its types
- Morphology of bacteria: classification of microorganisms, bacteria cell, staining of bacteria-Gram and ZN stain
- Physiology of bacteria: Growth and nutrition of bacteria, Growth curve
- Sterilization and disinfection: Dry heat, moist heat sterilization, common disinfectants use in hospital
- Culture media: simple and complex media, preparation and its use
- Culture methods: aerobic and anaerobic
- Identification of bacteria

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Unit-2: Immunology

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- Infection
- Immunity
- Antigen
- Antibody

Unit 3: Collection, transport and processing of clinical specimens:

- Sputum
- Urine
- Pus
- Blood
- CSF

Unit 4: Systemic bacteriology (Morphology, clinical features and lab diagnosis)

- *Staphylococcus aureus*
- *Streptococcus pyogenes*
- *Pneumococcus*
- *E.coli*, *Klebsiella* and *Pseudomonas*

Unit 5: Health care associated Infections: Sources, Method of transmission and Prevention

Unit 6: Principle and Practices of Biomedical waste management:

Practical: (40 HOURS)

- Microscope: parts function, focus, care and handling
- Hanging drop preparation
- Performance of Gram's stain
- Performance of ZN stain
- Culture media preparation: Nutrient agar, Blood agar, Chocolate agar, NA slant,
- Mac Conkeys agar.
- Functioning of Autoclave and Hot air oven
- Visit to hospital for the demonstration of Biomedical Waste Management
- Aseptic practices in laboratory and safety precaution.

SECOND YEAR MEDICAL LABORATORY TECHNOLOGY

Each student shall undergo training in Skill Simulation Laboratory for learning certain basic clinical skills like IV/IM injection, setting IV-line, Cardio-pulmonary resuscitation (CPR), and Life support skills in the beginning of second year, for duration of continuous four days. (Board of Studies letter No.:FPMS/SV/BOS-MIN/0006/2016-17, dated 19/04/2017, and vide notification of Board of Management resolution Ref.:No. SVDU/R/2017-18/5056, dated 09/01/2018).

DMLT201- BIOCHEMISTRY (100 HOURS)

- Introduction and scope of Biochemistry
- Cell biology:- Prokaryotic and Eukaryotic, cell organelles, subcellular fraction and its function
- Functioning Clinical Laboratory:- Duty of laboratory technician
- Laboratory Safety including Biomedical waste disposal
Collection and Preservation of Sample/specimen

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- Reagents: - Preparation, Formulation, storage, safety and uses.
- Biomedical importance of Carbohydrate, proteins, Lipids and Nucleic Acid.
- Chemistry of Enzymes and isoenzymes.
- Metabolic aspects of Carbohydrate, proteins and Lipids with respective laboratory Analysis.
- Chemistry of Body fluids: - Blood, CSF, Urine, Milk, Bile, Gastric Juice and Saliva.
- Buffers of Body system and pH regulation.
- Laboratory management: - Sample rejection criteria,
- Quality control- IQC & EQC, Quality indicators.
- Introduction of Equipment's:-
- Centrifuge
- Colorimeter
- Spectrophotometer
- Auto analysers
- Electrolyte analyser
- ELISA
- ABG analyser.
- Organ function Test: - LFT, RFT, TFT, Gastric function test, Cardiac function test
- Clinical Enzymology
- Establishment of Beers and Lamberts law Estimation of blood sugar
- Estimation of blood urea, urea clearance
- Estimation of cholesterol in serum
- Estimation of total protein, albumin & A:G ratio
- Estimation of creatinine
- Lipid profile
- Estimation of serum amylase
- Estimation of serum uric acid
- Estimation of bilirubin (direct & indirect)
- Estimation of SGOT & SGPT
- Estimation of serum alkaline phosphatase
- Estimation thyroid hormone
- Blood gas analysis

PRACTICALS:

(60 HOURS)

- Reactions of Carbohydrate
- Reactions of Protein: - Precipitation and Colour reaction.
- Analysis of Normal Urine:- Physical, Chemical and Microscopic
- Analysis of abnormal Urine:- Physical, Chemical and Microscopic
- Qualitative analysis of Saliva.
- Qualitative analysis of Milk
- Qualitative analysis of Bile.
- Qualitative analysis of CSF.
- Qualitative analysis of Gastric juice.

DMLT202-PATHOLOGY

(100 HOURS)

Unit 1- Human blood

- Human blood group antigens and antibodies
- Blood group systems
- Sub. – group
- Source of antigens and types of antibodies
- Blood group System

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- Types of Antigen
- Mode of Inheritance
- Types of Antibodies
- Other Blood group Antigens
- Blood Collection
- Selection and screening of donor
- Collection of blood
- Various anticoagulants
- Storage of Blood.
- Changes in Blood on Storage

UNIT II: IMMUNOLOGY AND SEROLOGY

- Hormones
- Thyroid Hormones
- Growth Hormone
- Insulin Glycosylated 2) Hemoglobin
- COOMB'S Test
- Direct and Indirect Test
- Titration of Antibody

PRACTICALS:

(60 HOURS)

- Fixation of tissues
- Classification of Fixatives
- Tissue Processing
- Collection
- Steps of fixation
- Section Cutting
- Microtome and Knives
- Techniques of Section Cutting
- Mounting of Sections
- Frozen Sections
- Decalcification
- Fixation
- Decalcification
- End Point
- Staining Dyes and their properties, H & E Stain, Special Stains Blood grouping
- Tube Method
- Slide Method
- COOMB'S Test
- Anti D Titre

DMLT203 MICROBIOLOGY

(100 HOURS)

Unit 1 - Revision of General microbiology

- History: Louis Pasteur, Robert Koch
- Microscope: Parts, function and its types
- Morphology of bacteria: classification of microorganisms, bacteria cell, capsule, flagella, fimbriae and spore, staining of bacteria-gram and ZN stain
- Physiology of bacteria: Growth and nutrition of bacteria, Growth curve

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- Sterilization and disinfection: Dry heat, moist heat sterilization, filtration, Radiation, disinfectants use in hospital
- Culture media: simple and complex media, preparation and its use
- Culture methods: aerobic and anaerobic
- Identification of bacteria: catalase test, coagulate test, oxidase test, Urease test, IMVic TESTS
- Antimicrobial susceptibility tests

Unit 2: Immunology

- Antigen
- Antibody: structure and function, types
- Antigen-antibody reactions: Agglutination tests, Precipitation tests, Immunofluorescent tests, ELISA, Immunochromatographic tests
- Immunoprophylaxis

Unit 3: Systemic bacteriology

- Staphylococcus aureus
- Streptococcus pyogenes
- Neisseria species
- Salmonella typhi
- Shigella species
- Vibrio cholera
- Clostridium species
- Corynebacterium diphtheria
- Mycobacterium Tuberculosis
- Mycobacterium leprae
- Spirochetes-treponema pallidum

Unit 4: Parasitology

- Protozoa:
 - *Entamoeba Histolytica*
 - *Giardia Lamblia*
 - *Trichomonas vaginalis*
 - *Plasmodium specie*
- Helminthes
 - Cestodes: *Taenia solium*, *Taenia saginata*, *Echinococcus granulosus*
 - Trematodes: *Schistosomes*
 - Nematodes: *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Enterobius vermicularis*, *Trichuris*, *Strongyloides*, *Filarial worm*

Unit 5: Immunology

- Immune system: structure and function
- Complement system
- Hypersensitivity
- Autoimmunity
- Immunodeficiency disease

Unit 6: Mycology (clinical features and laboratory diagnosis)

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- Introduction, classification of fungus
- Superficial mycosis: Dermatophytes
- Subcutaneous mycosis: Mycetoma
- Dimorphic fungus
- Opportunistic mycosis: *Candida albicans* , *Aspergillus species*, *Cryptococcus neoformans*

Unit 7: Virology

- General properties of Virus: morphology, replication, viral haemagglutination, virus cultivation, virus classification.
- Herpes virus
- Rhabdovirus
- Hepatitis Virus
- HIV
- Polio Virus
- Rota virus, dengue, chickungunia.

Unit 8: Applied Microbiology

- Hospital-acquired infections & Laboratory Hazards
- Biomedical waste management.
- Quality control in Diagnostic Microbiology.
- Recent advances in Diagnostic Microbiology

PRACTICALS:

(60 HOURS)

- Preparation of stains viz. Gram, ZiehlNeelsen (ZN)
- Performance of Gram's staining and focus
- Performance of ZN staining and focus
- Preparation and pouring of media – Nutrient agar, Blood agar, chocolate agar, Mac Conkey agar, NA slants, Triple sugar iron agar, Sabouraud dextrose agar
- Operation of autoclave, hot air oven, filters like Sietz and membrane and sterility tests.
- Washing and sterilization of glassware (Plugging and packing)
- Disposal of contaminated materials like cultures.
- Quality control of media, reagents etc.
- Care and maintenance of common laboratory equipments like water bath, centrifuge, refrigerators, incubators, etc.
- Parasitology: Stool examination for egg and cyst (saline and iodine mount), stool concentration techniques.
- Serology: WIDAL, RPR, ASO, MALARIAL ANTIGEN, DENGUE
- Aseptic practices in laboratory and safety precautions
- Collection of specimens for Microbiological investigations such as Blood, Urine, sputum, Pus (Swabs),
- Identification of Bacteria of Medical Importance up to species level: *S.aureus*, *E.coli*, *Klebsiella*, *Pseudomonas*, *Proteus*, *Salmonella Typhii*.
- Performance of AST.

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- Methods for the preservation of bacteria, Maintenance of stock cultures for both bacteria and fungus.
- Mycology: KOH mount, LPCB mount, Slide culture techniques, Colony identification of fungus,- Aspergillus species, candida albicans, Dermatophyte.
- Candida: Gram stain, Germ tube test, colony characteristics on Chrome agar.
- Revision of Parasitology: stool examination for Round worm, Hook worm, Trichuris
- Thick and thin smear for Malarial parasite
- Serology: Widal tests, RPR test, ASO test
- ELISA – performance

THIRD YEAR MEDICAL LABORATORY TECHNOLOGY

Internship (Integrated Practice) -

Total Hours: 1000

The internship will span 1 Year. This will include 6 hours of practice a day, totaling to 1000 hours during internship year. As a part of this, the students will maintain a work logbook which will be duly endorsed by the supervisor or trainer. At the end of internship, the candidate shall submit the work log book along with certificate from the training institute.

CODE OF PROFESSIONAL CONDUCT INTRODUCTION

The Code of Professional Conduct is designed and set out as guidance for the clinical practitioner within the relationship that exists with every patient receiving health care.

Essential to that relationship is the patient's trust in the practitioner. This trust hangs upon the patient's assurance of being the practitioner's first concern during their clinical encounter, and upon the patient's confidence that the care received will be competent, whether in diagnosis, therapy or counseling.

STANDARD OF PRACTICE AND CARE

Patients are entitled to the highest standard of practice and care. The essential elements of this are professional competence, good relationships with patients and colleagues and observance of professional ethical obligations.

In providing care you must therefore:

- Recognize the limits of your professional competence.
- Be willing to consult colleagues
- Keep clear, accurate and contemporaneous patient records which report the relevant findings.
- Keep colleagues informed.
- Pay due regard to the efficacy and the prudent use of resources.
- Be competent, truthful, and accurate, when reporting on investigations.
- Be competent when giving or arranging treatment.

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Patient's rights

- Listen to patients and respect their views.
- Treat patients politely and considerately.
- Respect patients' privacy and dignity.
- Give information to patients in a way they can understand.
- Respect the right of patients to be fully involved in decisions about their care.
- Respect the right of patients to refuse treatment or to take part in teaching or research, reporting the refusal to the person requesting the procedure.
- Respond to complaints promptly and constructively.
- Ensure that your views about a patient's life style, culture, beliefs, race, colour, sex, sexuality, age, social status, or perceived economic worth, do not prejudice the service you give.

CONFIDENTIALITY

Patients have a right to expect that you will not pass on any personal information which you learn in the course of your professional duties, unless they agree

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