

IAP-ICC COLLEGE OF PEDIATRIC CRITICAL CARE

Diploma in Pediatric Critical Care Technology I year Syllabus

Minimum eligibility is 10+2 from Central or State board preferably with Science Stream

Duration of the Program – 1 year

Selection – Based on Marks and interview

Theory – 100 teaching hours

Applied Anatomy, Physiology, Pharmacology, microbiology and infection control – 3 months
Practical, Skills, Assisting in Procedure, Equipment Handling – 9 months

1. Applied Anatomy related to critical care

I RESPIRATORY SYSTEM – Technicians need to familiarize with very basics of anatomical structure and terminology required, as they are expected to assist in intubation, ventilation, suctioning, intercostal tube insertion, maintenance and bronchoscopy.

- Introduction
- Medical Terminology
- Anatomical terms
- Anatomy of the upper respiratory tract
- Nose, oral cavity
- Pharynx, Larynx
- How Pediatric airway is different from adult airway with its clinical implications.

Anatomy of thoracic cage bones, muscles

Anatomy of the lungs - overview

Pleura, lobes of lung, bronchi, trachea, hilum, bronchial tree

Alveolus, Bronchioles, Smaller diameter of distal airway in children and its clinical implication.

II CARDIOVASCULAR SYSTEM

- Overview of CVS
- Anatomy of heart - Pericardium, myocardium, endocardium, valves,
- Overview of transition from fetal circulation.
- Common Congenital heart disease – Gross anatomical defect.
- Anatomy of Vascular system - Major Vessels, Arteries, Veins, Capillaries.

III CENTRAL NERVOUS SYSTEM

- Basic organisation of the nervous system - Central, Peripheral

- CSF spaces and drainage

IV Renal and Excretory system: Basic knowledge required for insertion, maintenance of urinary catheter, measuring intra-abdominal pressure, Maintenance of PD and CRRT.

- Anatomy of Kidney and Urinary tract. (Pictorial diagram based)
- Normal Urinary output
- Renal function tests, renal disorders (AKI , CKD)

V. Digestive system

Anatomy of the GIT – Terminology and applied anatomy for NG/OG Tube insertion
 Food Digestion in the mouth, stomach, intestine
 Absorption of foods

2.Applied physiology related to critical care

I. RESPIRATORY SYSTEM

- Physiology of breathing
- Age appropriate variation of RR
- Mechanics of Breathing, Respiratory pump
- Gas exchange & transport-
 - O2 Transport and abnormalities
 - CO2 Transport and abnormalities
- Assessment Work of breathing
- Acid - base balance
- Arterial Blood Gas
- Types of respiratory failure - causes and treatment

II CARDIOVASCULAR SYSTEM

- Cardiac cycle
- Cardiac conducting system
- Regulation of rate, basic arrhythmias
- Principles of ECG, Normal ECG
- Pattern recognition of abnormal ECG
- Blood pressure
- Systolic, diastolic, pulse pressure, mean
- Age appropriate BP, HR as per APLS Guideline
- Maintenance of normal blood pressure and factors affecting it
- Assessment of hemodynamic parameters

- Central venous pressure.
- Recognise the following regarding arterial cannulation -
 - Indications
 - Cannulation sites
 - Possible complications
 - Normal pressures and their significance
 - Pressure wave forms

. CVP Monitoring

- Indications
- Factors affecting measurement
- Insertion sites
- Types of catheters
- Correct technique of pressure measurement.

3. Clinical Pharmacology:

- Drugs used in Cardiac arrest
- Drugs used for Intubation – Sedation, Analgesia, Muscle relaxant
- Drugs Used in Shock- Inotropes and Vasopressors
- Medical gases: O₂
- Bronchodilator
- First line of Anticonvulsants –
- Analgesics; sedatives, Neuromuscular blocking agents
- Antiseptic agents

4. Clinical Microbiology and Infection Control

INTRODUCTION - Importance of infection in an ICU

Agents causing Infection

SPREAD OF INFECTION - Source; host; transmission

Biohazardous materials

INFECTION CONTROL & UNIVERSAL PRECAUTIONS

- Sterilisation & Disinfection - concepts
- Methods of sterilization
- Spread of infection
- Elimination of source - Cleaning and sterilizing equipment
- Interrupting transmission of infection - role of health care workers
- Disposal of infection wastes
- Surveillance; quality control

SPECIFIC INFECTIONS

Nosocomial Infections: Types – Prevention, Bundle of Care (VAP, CLABSI, CAUTI).

HIV-AIDS .

Hepatitis A, B, C

Skill, Procedures, Equipment Handling and Maintenance

1. RECOGNITION OF CARDIORESPIRATORY ARREST

2. BASIC LIFE SUPPORT (Hands on Training)

- Keeping Airway open – Head Tilt Chin Lift, Jaw Thrust, Mouth to mouth breathing, Bag Mask Ventilation (Ambu and T-piece)
- Cardiac Compression -

3. CONCEPTS IN ADVANCED LIFE SUPPORT

- Drugs
 - Defibrillator - strictly under Medical Supervision
 - Team Training, Mock Code Blue.

4. Airway Care

INDICATIONS FOR ARTIFICIAL AIRWAY

- Relieving airway obstruction
- Secretion removal – Suction catheters, Machine, Pressure.
- Protecting the airway -
- Positive Pressure Ventilation

SELECTING AND ESTABLISHING AN ARTIFICIAL AIRWAY

- Nasal airways
- Pharyngeal airways
- Laryngoscope and blades of different types and size.
- Laryngeal Mask Airway(LMA) – Sizes, Procedure
- Tracheal airways Assisting in procedure – Sizes of ET Tube, Calculation of appropriate size
- Cricothyrotomy - Assisting in procedure.
- Tracheostomy tube care, Assisting in change of Tracheostomy tube.

AIRWAY CLEARANCE TECHNIQUES

- Airway suctioning – Technique, Asepsis, pressure, equipment, catheter size.
- Bronchoscopy

AIRWAY MAINTENANCE

- Securing the airway and confirming placement
- Basic DOPE assessment
- Providing adequate humidification – Servo-control, HME Filter
- Minimizing nosocomial infections
- Providing cuff care
- Facilitating clearance of secretions – Including In line suctioning.
- Trouble shooting airway emergencies
- Chest Physiotherapy

EXTUBATION

- Procedure
- Post extubation care & complications

5. Oxygen Therapy

- Sources of oxygen for therapy
- Storage of oxygen
- Oxygen delivery systems
- Hazards of oxygen
- Modes of O₂ therapy
- Monitoring O₂

Blood gases in patient

Pulse oximetry – Principles, types of sensors, interpretation, trouble shooting

6. NON INVASIVE ventilation –

HHFNC – Equipment, Circuit, Types of nasal prong, trouble shooting, disinfection.

CPAP/BiPAP – Types of Machines, interfaces, application of Interface, trouble shooting, cleaning, disinfection.

7. MECHANICAL VENTILATION -

Basic concepts: - Mechanics of ventilator

- Indications
- Ventilator settings
- Tidal volume
- Pressure – Peak, Pplateau, PEEP, Pressure support

FiO₂

Modes of ventilation - Controlled, Assisted, SIMV, Pressure Support

Alarm settings

Care of ventilator & tubings- -Sterility

Types of Tubes – Infant/Pediatric and Adult, Indication.

HFOV – Basic concept, Operation, Parameters, Tubings and accessories maintenance.

Portable/Transport Ventilators, Home Ventilators – Operation, Setting, Trouble Shooting.

• Inhaled Nitric Oxide Delivery System

Inhaled drug therapy - Nebulization - different types, advantages & disadvantages

- In line Vibrating mesh technology

- Use and Maintenance of In-line nebulizer

8. CARE OF PATIENTS ON VENTILATOR

- Ensuring proper placement of tube
- Cuff pressure,

- Tracheobronchial hygiene, suctioning
- Humidification, Chest physio
- Ventilator settings
- Monitoring ventilatory parameters

9. Bronchoscopy –

- Assisting in procedure, Arranging disposables
- Note down findings
- Cleaning
- Sterilization

10. CARDIOVASCULAR SUPPORT:

Procedure to be done -

1. Peripheral venous cannulation
2. IO Needle insertion

A. Assisting in

1. Arterial and
2. Central venous cannulation
3. Pericardiocentesis

B. Placement of ECG leads and taking 12-lead dynamic ECG.

C. Bedside Monitor: System introduction, external devices, monitoring basics, setting different parameters, setting ECG, Respiration, Temperature, NIBP, Spo2, Invasive BP, cardiac output, ETco2.

Operation, display, recording, printing, Cleaning & care, Troubleshooting, safety precautions

D. Use of infusion devices for vasoactive medications

Syringe Pump and Infusion Pump - Principles, operation, monitoring, troubleshooting

E. Assisting in electrical cardioversion and defibrillation -

F. Setting up invasive pressure monitoring - leveling, calibration, zeroing; measuring pressures, troubleshooting.

G. Blood sampling from Central venous and arterial line.

H. ECMO (if available) – Assisting perfusionist in maintaining ECMO and care of circuit, performing ACT testing .

16. CHEST XRAY

NORMAL CHEST X-RAY

- Normal anatomy
- Basic physics of X-ray and assessment of film quality
- Cardiac configuration .
 - Lung fields and airway
 - Optimum position of - ET, NG, Central Lines

ABNORMAL CXR:

- Pneumothorax , Hemothorax , Pulmonary oedema , CCF, ARDS , Pneumonia

17. Ultrasound and Echocardiograph machine – Maintenance and basic concept of different probes.

18. ARTERIAL BLOOD GASES – Specimen collection & handling, operation, principle of operation, maintenance, trouble shooting, installation, programming, Transportation of sample

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19. CARE OF CHEST TUBE

Drainage systems of pleural air, fluid

20. NERVOUS SYSTEM:

Application of on-line immobilization (C spine protection) , Cervical neck collar.

Assisting in:

Lumbar puncture

Application of intracranial pressure monitoring device

21. Renal failure in critically ill patients –

Procedure to be done – Bladder Catheterization

Assisting in –

PD Catheter Insertion

HD Line insertion

Renal Biopsy

Automated Peritoneal Dialysis (APD) Machine - Handling, operation, principle of operation, maintenance, trouble shooting, installation, programming,

CRRT : a) Parts of machine, operation, principle underlying, maintenance & troubleshooting and quality control.
Maintenance of circuit.

b) Clinical application

22. GASTROINTESTINAL

1. Assisting in

A Placement of trans oesophageal devices.

NG tubes, enteral feeding tubes

23. Pediatric critical care Transport

Assist in all Pediatric critical care related issues

EQUIPMENT MAINTENANCE & BASIC TROUBLESHOOTING:

Ventilators, CPAP, BiPAP machines, HFOV machine and tunings

Pumps - Infusion, Syringe , Feeding pump

Monitors - Stand alone & multiparameter , Pulse Oxymeter

Capnometry

ECG Machine

ABG Machine

Glucometer +/- Bedside Blood Ketone-meter

Defibrillator

Ultrasound machine

Echocardiography machine

Bronchoscope

Portable X-ray Machine

Nebulizer

Suction Apparatus

APD and CRRT Machine

High level of interpersonal skills and communication skills.

Role of communication

Defining Communication

Classification of communication

Purpose of communication

Major difficulties in communication

Barriers to communication

Characteristics of successful communication –

Communication at the work place

BASICS OF COMPUTER – Data entry, Equipment log

DIPLOMA IN CRITICAL CARE TECHNOLOGY

I YEAR EXAMINATION PATTERN

Sl. No.	Subject Title	Internal assessment IA		College Exam		Practical	
		Max	Min	Max	Min	Max	Min
1.	Applied Anatomy, Physiology, Microbiology & Infection Control Including CSSD	50	25	100	50	100	50
3	Critical care technology (Airway, O2 therapy, care of patient on ventilator, Equipment maintenance and troubleshooting)	50	25	100	50	100	50

Internal Assessment(IA):

1. Theory (20)
2. Log Book (10)
3. Practical (20)

Question paper pattern:

Essay	3 x 10 = 30 Marks
Short Notes	10 x 5 = 50 Marks
MCQ	20 x 1 = 20 Marks
Total	100 Marks

**DIPLOMA IN CRITICAL CARE TECHNOLOGY
PRACTICAL EXAMINATIONS**

OSCE 10 X 10 = 100 Marls

1. DRUGS
2. FLUIDS
3. AIRWAY TUBES
4. Catheters
5. O 2 THERAPY DEVICES
6. MONITORS
7. DEFIBRILLATOR
8. VENTILLATOR
9. STERILIZATION TECHNIQUES

10. CARDIO PULMONARY RESUSCITATION