

PROFESSIONAL TRAINING - I

Submitted in partial fulfilment of the requirements for the award of
Bachelor of Technology degree in Biomedical Engineering

By

VIDULA NANCY N (41240039)



**DEPARTMENT OF BIOMEDICAL ENGINEERING
SCHOOL OF BIO AND CHEMICAL ENGINEERING**

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A++” by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

OCTOBER-2023



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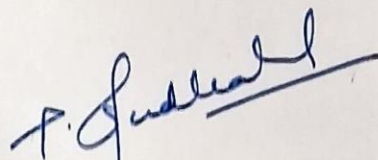
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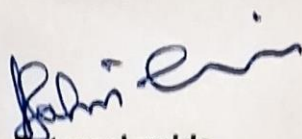
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BONAFIDE CERTIFICATE

This is to certify that this professional training report is the bonafide work of **VIDULA NANCY N (41240039)** who has completed the "HANDS ON TRAINING PROGRAM" in a part of professional development under our supervision from **19.12.2022** to **30.12.2024**

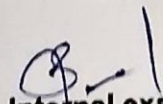

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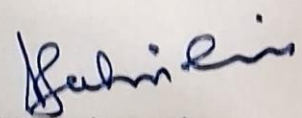

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**MEDCUORE**
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for their participation in the Online Internship on
"Bio-Electric Signals Training "
at MedCuore Medical Solutions Pvt Ltd, Chennai
From 19-06-2023 to 23-06-2023

ONLINE TRAINING DURATION: ONE WEEK
Topics Covered: Introduction of Bioelectric signals, Blood Pressure Monitoring, ECG, EEG,
Patient Monitor, and EMG.





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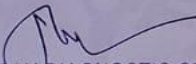
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TO WHOM IT MY CONCERN

This is to certify that Ms Vidula Nancy.N a student of (Biomedical engineering) Sathyabama Institute of science and technology, Chennai, Tamilnadu, India has Successfully Completed internship programme 2 weeks (from 19.12.2022 to 30.12.2022) at this BERACAH DIAGNOSTIC CENTRE. During the period of this internship programme with us she was found punctual,hardworking and inquisitive

We wish her every success in life

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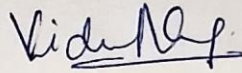
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DECLARATION

I **VIDULA NANCY N** hereby declare that the professional training report completed by me during my professional training at Medcure and Beracah Diagnostic centre under the guidance of **Dr. A. Sabarivani, M.Tech., Ph. D.** and **Ms. Sindu Divakaran** is submitted in partial fulfilments of the requirements for the award of Degree in Bachelor of Technology in Biomedical Engineering



SIGNATURE OF THE CANDIDATE

DATE: 03.10.2023

PLACE: CHENNAI

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I wish to express my most sincere and profound gratitude to our beloved **Founder Chancellor Col.Dr. JEPPIAR,M.A. ,B.L.,Ph.D.**, for providing me an opportunity to educate myself.

I am also pleased to acknowledge sincere thanks to our **Chancellor Dr. MARIAZEENA JOHNSON , B.E.,M.B.A.,M.Phil.,PhD.** and President **Dr. MARIE JOHNSON, B.E., M.B.A., M.Phil., PhD.** and our beloved Vice Presidents **Mr.J. ARUL SELVAN, Ms. MARIA BERNADETTE TAMILARASI, Ms. MARIA CATHERINE JAYAPRIYA** of Sathyabama Institute of Science and Technology, Chennai, for their unwavering support to carry out my research work.

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I would like to extend my thanks to **Dr.B.SHEELA RANI ,M.S., Ph.D.**, Director (research),Our Dean of school of Bio and Chemical sciences **DR. RAMESH KUMAR, M.Sc., Ph.D.** our head of the department **Dr. T. Sudhakar M.Sc., Ph.D.**, and our professional training guides **Ms. SINDU DIVAKARAN** and **Dr.A.SABARIVANI ,M.Tech., Ph.D.** Thank you for being a part of this educational journey with us.

I am genuinely thankful for the opportunities offered to me by **Ms. GEETHA BALASUBRAMANI**, Director- Research & Development at MedCuore Medical Solutions Pvt. Ltd., **Mr. T. SURESH BABU**, Bearach Diagnostic Centre and **JOLEN HOSPITAL**, Sembakkam for their mentorship, guidance and patience created a welcoming and conducive learning environment

And I wish to express my thanks to all the Teaching and Non-Teaching staff members of the department of biomedical engineering who were helpful in many ways for the completion of the report.

ABSTRACT

This report provides a comprehensive overview of my internship experience in the field of biomedical engineering at Beracah Diagnostic Centre located, Chennai. over the course of 19.12.2022 – 30.12.2022, This training equipped me with the knowledge and practical skills required to contribute effectively to accurate medical diagnoses and patient care. The internship encompassed many activities, including the maintenance and calibration of devices, their working and designs. Through hands on experiences and exposure to cutting edge medical devices, I had the opportunity to apply theoretical knowledge acquired during my academic coursework to real world scenarios.

This report reflects my knowledge during my online professional training at Medcuore, Chennai. I gained valuable insights in bioelectric potential measurement, patient monitoring system, and the use of instruments such as ECG, EMG, EEG and blood pressure monitors. This training gave broader implications of biomedical engineering in enhancing patient care and healthcare delivery, underscoring the significance of this field in the evolving landscape of healthcare technology.

In conclusion, my internship training at Beracah Diagnostic Centre not only provided a platform for practical learning but also ignited a passion for the field of biomedical engineering. It is my hope that this report serves as a testament to the valuable experiences gained during this internship and the valuable contributions of biomedical engineers in advancing healthcare

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I. INTRODUCTION

In the realm where cutting-edge technology converges with the profound pursuit of human health and well-being. Over the course of my internship, I had the privilege to delve into the intricate realm of medical technology, witness the seamless integration of science and compassion, and contribute to the advancement of healthcare solutions that touch lives in profound way. This report encapsulates my experience, documenting the role that biomedical engineers play in the ever-evolving landscape of healthcare. Throughout this report, I will reflect upon the valuable insights gained, and the invaluable lessons learned during my tenure.

Biomedical devices provide a critical role in the healthcare system to positively impact patient well-being. This paper aims to provide the current classifications and subclassifications of hardware and software medical devices. Biomedical devices, also known as medical devices or medical equipment, are instruments, apparatuses, machines, implants, or software used in healthcare to diagnose, treat, monitor, or prevent medical conditions. These devices play a crucial role in modern medicine by helping healthcare professionals deliver better patient care, improve treatment outcomes, and enhance the quality of life for individuals with various medical conditions.

Biomedical devices encompass a wide variety of products, including diagnostic equipment (e.g., MRI machines, blood glucose monitors), therapeutic devices (e.g., pacemakers, insulin pumps), surgical instruments (e.g., endoscopes, robotic surgical systems), assistive devices (e.g., hearing aids, prosthetic limbs). Biomedical devices are integral to medical imaging technologies like X-ray machines, CT scanners, ultrasound machines, and MRI scanners. These devices allow healthcare providers to visualize the internal structures of the body for diagnostic purposes. Devices for patient monitoring, such as electrocardiograms (ECGs or EKGs), pulse oximeters, and blood pressure monitors, help healthcare professionals track vital signs and the overall health status of patients. Some biomedical devices are surgically implanted into the body to address medical conditions.

As we delve into the depths of this report, you will gain an understanding of the multifaceted responsibilities shouldered by biomedical engineers in a hospital setting. From designing and maintaining critical medical equipment to collaborating with healthcare professionals on cutting-edge research initiatives, this internship has exposed me to the dynamic nature of this field. Moreover, it has reaffirmed my belief that biomedical engineering is not merely a profession; it is a vocation that holds the promise of improving lives and pushing the boundaries of human potential.

1.1 OVERVIEW

The primary aim of this internship report is to provide a comprehensive and insightful overview of my internship experience as a biomedical engineer. This report aims to document the practical knowledge and skills acquired during the internship, along with a reflection on their application in a real-world healthcare environment. Furthermore, it seeks to showcase the role of biomedical engineers in enhancing the quality of healthcare services, patient outcomes, and the advancement of medical technology.

The scope of this internship report encompasses a wide range of aspects related to biomedical engineering. This report will delve into the responsibilities associated with the maintenance, calibration, and management of various biomedical equipment and devices critical to patient care. It will outline the protocols followed to ensure the optimal functionality and safety of medical devices.

This internship report aims to provide a holistic understanding of the role responsibilities of a biomedical engineer, as well as the broader impact of biomedical engineering on healthcare delivery and patient well-being. This report is an overview of my knowledge and experience gained during my professional training. This report gives brief information about diagnostic and therapeutic instruments like ECG, Ultrasound, CT, X-ray.

I. RADIOLOGY UNIT

2.1. ULTRASOUND

An ultrasound scan is a medical test that uses high-frequency sound waves to capture live images from the inside of your body. It's also known as sonography. The technology is similar to that used by sonar and radar, which help the military detect planes and ships. An ultrasound allows your doctor to see problems with organs, vessels, and tissues without needing to make an incision. Unlike other imaging techniques, ultrasound uses no radiation. For this reason, it's the preferred method for viewing a developing fetus during pregnancy. Ultrasound uses high-frequency sound waves to produce images of the inside of the body. It is a non-invasive and widely used diagnostic tool in the field of medicine, allowing healthcare professionals to visualize and assess various organs and tissues. Ultrasound imaging works on the principle of sending sound waves into the body and capturing the echoes as they bounce back. Different tissues and structures in the body reflect these sound waves differently, producing varying levels of echo. These echoes are then converted into real-time images on a screen.



Fig 2.1 ULTRASOUND

Ultrasound is used in various medical specialties, including obstetrics and gynecology, cardiology, radiology and many others. It can be used to examine the abdomen, pelvis, blood vessels, muscles, tendons, and even guide minimally invasive procedures like biopsies or drain placements.

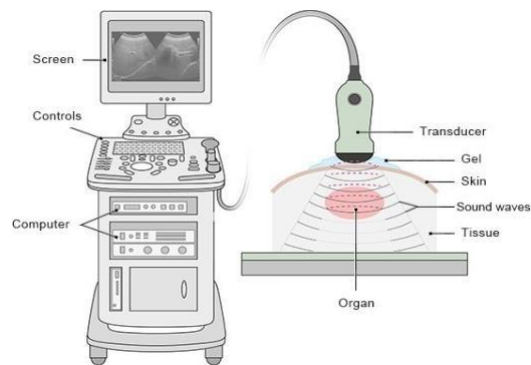


Fig 2.2 ULTRASOUND MECHANISM

The advantage of Ultrasound is safe and non-invasive, as it does not involve radiation like X-rays or CT scans. It is particularly valuable for examining pregnant women and fetuses. Additionally, it provides real-time imaging, allowing immediate visualization of moving structures such as the heart. An ultrasound machine consists of a transducer (a handheld device that emits and receives sound waves), a computer system to process the data and display images, and a monitor to view the images in real-time. Ultrasound machines are equipped to create three-dimensional (3D) or four-dimensional (4D) images, providing more detailed and realistic views of the fetus during pregnancy or other anatomical structures.



Fig 2.3

2.2 X-RAY

An x-ray machine sends individual x-ray waves through the body. The images are recorded on a computer or film. Structures that are dense (such as bone) will block most of the x-ray waves and will appear white. Metal and contrast media (special dye used to highlight areas of the body) will also appear white. An x-ray machine is one of the most common medical equipment used in hospitals and laboratories to diagnose infections and locate fractures.



Fig 2.4 X RAY MACHINE

X-ray machine mainly utilizes the basic properties of the X-rays for its operation. The natural tendency of X-rays is to penetrate soft areas with ease and get absorbed by dense areas. This ability of the X-rays serves to be the working principle of the X-ray machines and helps the user obtain detailed images of the internal structure of the body organs or the objects with



Fig 2.5

The use of X-rays for the purpose of imaging significantly eliminates the need to cut open the object or the body part to obtain the image of the internal structure of the target object or body organ. The X-rays used by the X-ray machines are produced by accelerating electrons at a relatively higher velocity and then directing them towards a target. On hitting the target, the electrons tend to decelerate and lose energy. During the process, a major portion of the kinetic energy possessed by them gets converted into heat energy and the rest portion into x-rays.

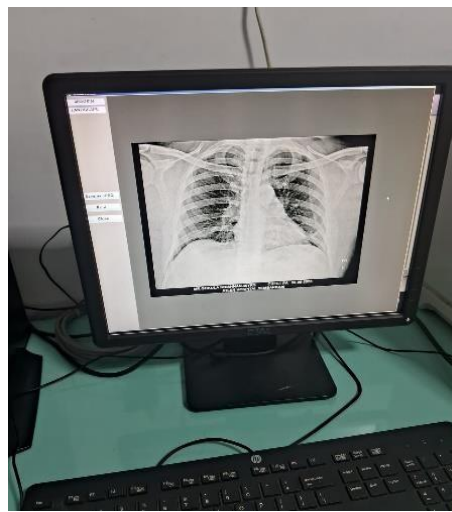


Fig 2.6 X RAY OUTPUT

2.3 ELECTROCARDIOGRAM [ECG]

An electrocardiogram, often abbreviated as ECG or EKG, is a diagnostic test that records the electrical activity of the heart over a specific period. This non-invasive and painless procedure provides valuable information about the heart's rhythm and can help identify various cardiac conditions. The human heart generates electrical impulses that trigger each heartbeat. These impulses originate in the sinoatrial (SA) node, the heart's natural pacemaker, and then travel through the heart's chambers, causing them to contract in a coordinated manner. An ECG involves attaching electrodes, which are small, adhesive patches or sensors, to specific locations on the patient's body. These electrodes are strategically placed on the chest, arms, and legs to capture electrical signals from the heart.

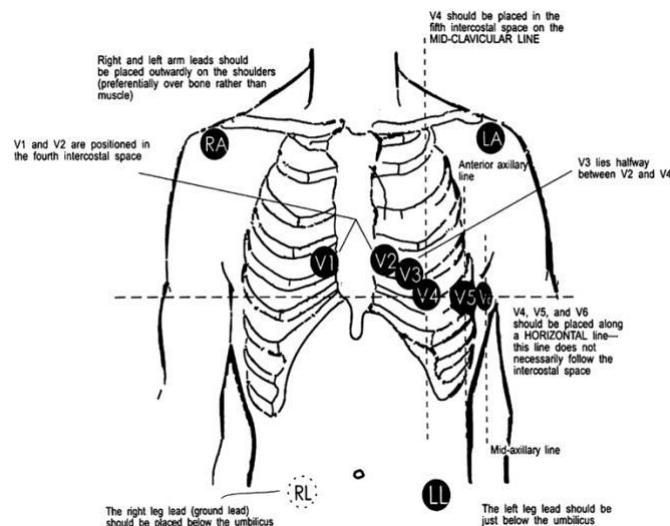


Fig 2.7 ECG ELECTRODE PLACEMENT

The electrodes are connected to an ECG machine, which records the electrical signals as a series of waves on a graph. The resulting ECG tracing represents the heart's electrical activity over time.

An ECG tracing typically consists of several components, including:

- > P-Wave
- >QRS Complex
- >T-Wave
- >ST Segment.
- >QT Interval

ECGs are essential for identifying irregular heart rhythms (arrhythmias) such as atrial fibrillation, ventricular tachycardia, or bradycardia. ECGs can provide information about the overall health of the heart, including signs of coronary artery disease, heart attacks (myocardial infarctions), and ischemia (inadequate blood flow to the heart muscle). Abnormal ECG findings can be indicative of imbalances in blood electrolytes (e.g., potassium, calcium), which can affect heart function.



Fig 2.8 ECG INSTRUMENT

There are different types of ECGs:

1. Resting ECG- Typically performed while the patient is at rest, lying down. It's the most common type of ECG.
2. Exercise Stress ECG (Treadmill Test): Measures the heart's response to physical activity and is often used to diagnose coronary artery disease.
3. Holter Monitor: A portable ECG device worn by the patient for an extended period (usually 24 to 48 hours) to record heart activity during daily activities.
4. Event Monitor: Similar to a Holter monitor but used intermittently to capture specific cardiac events or symptoms.

These are the types of ECG used in medical field. During my internship training I learnt about the Resting ECG.

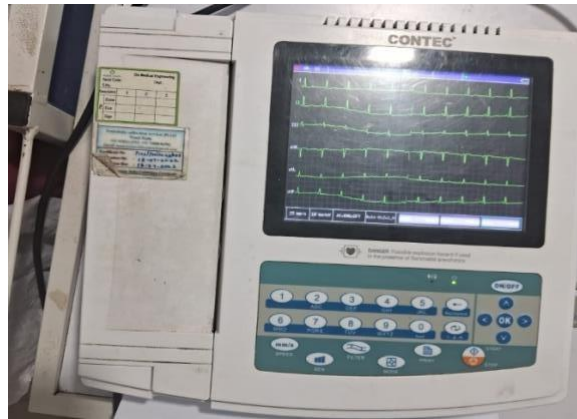


Fig 2.9 RESTING ECG MEASURED FROM PATIENT

Electrocardiograph is the graphical representation of the electronic activity of the heart during cardiac cycle to detect any abnormalities of the heart. The graph consist of QRS complex, T wave and P wave.

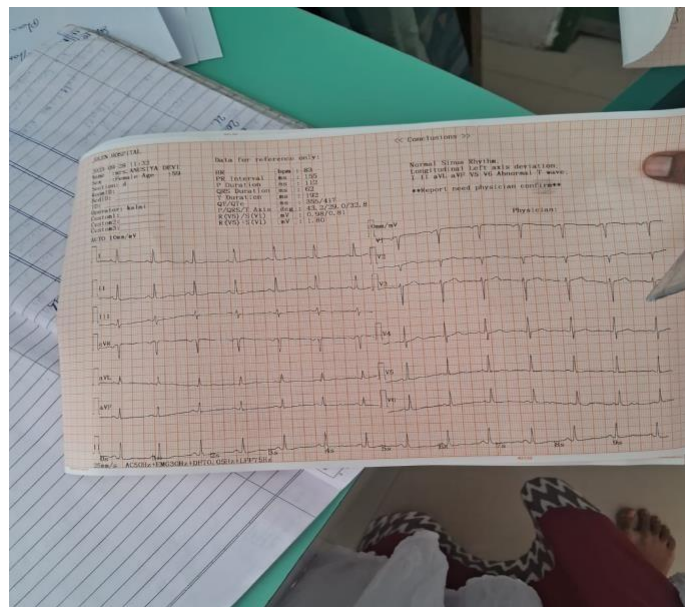


Fig 2.10 ELECTROCARDIOGRAPH

Application of ECG:

- It indicates the rate and rhythm or pattern of contraction of heart
- It gives a clue about the condition of heart muscle and is used to diagnose heart disorders
- It helps the doctors to determine whether the heart is normal, enlarged or if its certain regions are damaged
- It can also reveal irregularities in heart's rhythm known as 'arrhythmia.'

2.4 COMPUTED TOMOGRAPHY

Computed tomography, also called as CT or CAT (Computerized Axial Tomography), is a medical imaging technique that uses X-ray technology to create detailed cross-sectional images of the body. CT scanning is a powerful diagnostic tool, but it does involve exposure to ionizing radiation.

In a CT scanner, an X-ray tube emits a controlled beam of X-rays through the body. On the opposite side of the body from the X-ray source, there is a set of detectors that capture the X-rays after they pass through the body. The X-ray source and detectors are typically mounted on a rotating gantry. This gantry rotates around the patient during the scan. As the gantry rotates, it continuously collects a series of X-ray images or "slices" from various angles as it passes through the body. Each slice represents a thin cross-section of the body. A computer processes the raw X-ray data and uses mathematical algorithms to reconstruct the individual slices into detailed cross-sectional images. These images are typically in the axial plane (parallel to the body's length) but can be reformatted into other planes as needed. The resulting images can be viewed on a computer monitor and are often displayed in grayscale.



Fig 2.11 COMPUTED TOMOGRAPHY

CT scans are valuable in diagnosing and monitoring a wide range of medical conditions. They are frequently used to assess injuries after accidents or falls, such as fractures, internal bleeding, and head injuries. They help in detecting and staging tumours, planning radiation therapy, and assessing treatment response. It is used to evaluate the condition of various organs like the brain, heart, lungs, liver, and kidneys. CT scans provide detailed views of bones and joints, making them useful for diagnosing fractures and joint disorders.



Fig 2.12 CT IMAGES

II. ENDOSCOPY

Endoscopy is a medical procedure that allows a doctor to inspect and observe the inside of the body without performing major surgery. An endoscope is a long, usually flexible tube with a lens at one end and a video camera at the other.

Usually, an endoscope is inserted through one of the body's natural openings, such as the mouth, urethra or anus .An upper endoscopy, also called an upper gastrointestinal endoscopy, is a procedure used to visually examine your upper digestive system. This is done with the help of a tiny camera on the end of a long, flexible tube. A specialist in diseases of the digestive system (gastroenterologist) uses an endoscopy to diagnose and sometimes treat conditions that affect the upper part of digestive system.



Fig 3.1 ENDOSCOPY ROOM

Some of the more frequently performed endoscopies are the upper gastrointestinal (GI) for stomach-related issues and colonoscopy for colon cancer screening—both performed by a gastroenterologist, since their expertise is with the digestive system. An endoscopy room is where the endoscopy procedure is performed. Endoscopy is used for both diagnostic and therapeutic purpose.



Fig 3.2 ENDOSCOPIC PROBE

3.1 PROCEDURE

1. Preparation:

- Before the endoscopy, the patient is typically provided with instructions on fasting. This ensures that the stomach or intestines are empty, making it easier to visualize the organs. Patients may also be asked to stop taking certain medications, especially blood thinners, in the days leading up to the procedure.

2. Patient Positioning:

- The patient is typically positioned in a way that allows the healthcare provider easy access to the area being examined. This may involve lying on their back, side, or stomach, depending on the specific procedure.

3. Anaesthesia and Sedation:

- Depending on the type of endoscopy and the area being examined, the patient may receive local anaesthesia (numbing of the area) and/or sedation to help them relax and minimize discomfort. General anaesthesia is not typically required for most endoscopy procedures.

4. Insertion of the Endoscope:

- The endoscope is inserted through a natural opening in the body or through a small incision. Common entry points include the mouth (for upper gastrointestinal endoscopy), anus (for colonoscopy), or other openings depending on the target organ.

- The endoscope is gently advanced through the body, and the camera at the tip of the endoscope sends images to a monitor, allowing the healthcare provider to see the internal structures in real-time.

5. Examination and Intervention:

- During the procedure, the healthcare provider carefully examines the area of interest, looking for abnormalities, such as inflammation, ulcers, tumors, or other issues.

- Depending on the findings and the purpose of the endoscopy, various therapeutic interventions can be performed. For example, polyp removal, tissue biopsies, or dilation of narrowed areas may be done during the procedure.

7. Removal of the Endoscope:

- Once the examination or intervention is complete, the endoscope is slowly withdrawn from the body.

8. Recovery:

III. ICU AND OT

4.1 DEFIBRILLATOR

A defibrillator is a medical device that delivers an electrical shock to the heart to restore normal heart rhythm during a life-threatening cardiac arrhythmia, particularly ventricular fibrillation or ventricular tachycardia. These arrhythmias can cause the heart to beat irregularly and ineffectively, leading to cardiac arrest and, ultimately, death if not corrected promptly.

Defibrillators can be automated external defibrillators (AEDs) or manual devices used by trained healthcare professionals. They monitor the heart's electrical activity through electrodes placed on the patient's chest. In automated defibrillators, the device automatically analyzes the heart rhythm to determine whether a shock is needed. Manual defibrillators require a healthcare provider to interpret the rhythm and decide when to deliver a shock. If the device detects a shockable rhythm, it delivers an electrical shock to the heart. This shock is intended to depolarize the entire heart muscle, allowing the heart's natural pacemaker (the sinoatrial node) to regain control and establish a normal rhythm. After a shock is delivered, the device continues to monitor the patient's heart rhythm to ensure it remains stable

There are different types of Defibrillators:

1. Automated External Defibrillators (AEDs):

AEDs are portable, user-friendly devices designed for use by non-medical personnel, including laypersons. They provide voice prompts and visual instructions to guide users through the defibrillation process. AEDs are commonly found in public places, such as airports, shopping malls, and schools, to increase the chances of survival in cases of sudden cardiac arrest.

- A. Manual Defibrillators:

Manual defibrillators are typically used by healthcare professionals, including paramedics, nurses, and doctors. These devices offer more control and flexibility in terms of adjusting energy levels for shocks and fine-tuning the treatment.

- B. Implantable Cardioverter-Defibrillators (ICDs):

ICDs are surgically implanted devices used to continuously monitor a patient's heart rhythm. If a life-threatening arrhythmia is detected, the ICD can deliver an internal shock to restore normal rhythm.

Common Uses and Scenarios:

1. **Cardiac Arrest:** Defibrillators are used during cardiac arrest situations when a person has lost consciousness and is not breathing or has no detectable pulse. In these cases, prompt defibrillation can be lifesaving.

2. Ventricular Fibrillation (VF) and Ventricular Tachycardia (VT): These are the specific arrhythmias that defibrillators are designed to treat. VF is a chaotic, quivering heart rhythm, while VT is a rapid, abnormal rhythm in the heart's lower chambers (ventricles).

Defibrillation is an important step in Cardiopulmonary resuscitation (CPR). Defibrillators are mostly used in emergency conditions like cardiac arrest, accidents or other medical conditions



Fig 4.1 DEFIBRILLATOR

Before delivering a shock, it is crucial to ensure that no one is touching the patient or anything that could conduct electricity, as defibrillation can pose a risk to bystanders. In a healthcare setting, clear communication is vital to coordinate the delivery of a shock, ensuring the safety of both the patient and healthcare providers. The traditional defibrillators are placed in the chest and the wires called lead wires are placed in the heart.

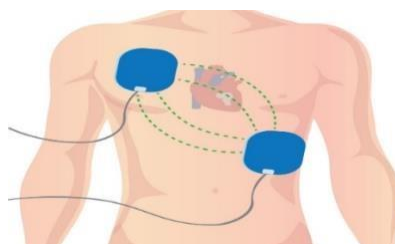


Fig 4.2 DEFIBRILLATOR PLACEMENT

4.2 PATIENT MONITORING SYSTEM

A patient monitoring system is a critical component of modern healthcare that involves the continuous or periodic observation, measurement, and recording of a patient's vital signs, physiological parameters, and other important health data. These systems are designed to ensure the timely detection of any changes or abnormalities in a patient's condition, allowing healthcare providers to deliver prompt and appropriate care.

Common sensors and devices in patient monitoring system includes electrocardiography (ECG) machines, pulse oximeters, blood pressure monitors, temperature probes and respiratory rate sensors. Patient data collected by sensors is often transmitted electronically to a central monitoring station or healthcare provider's device. Used to monitor parameters such as heart rate, blood pressure, respiratory rate, and body temperature and ECG monitoring to assess the electrical activity of the heart. They can detect arrhythmias and other cardiac abnormalities. They also use Pulse oximeters measure the oxygen saturation of a patient's blood, providing vital information about respiratory function. In some cases, patient monitoring systems are used to track blood glucose levels in patients with diabetes.



Fig 4.3 PATIENT MONITORING SYSTEM

There are two main types of patient monitoring systems. They are as follows:

1. Single Parameter Monitoring Systems: This kind of patient monitoring systems measure the blood pressure of the human body, SpO₂, ECG etc.
2. Multi Parameter Monitoring Systems: These patient monitoring systems monitor multiple critical physiological vital signs like respiration rate, electro cardiograph, blood pressure etc.

Patient monitoring systems are crucial to any surgical operation inside hospital and clinical walls. During an operation, the surgeon must have

continuous access to a patient's vital signs to mitigate the risk of something negative happening. In an operating room, you will typically find some form of thermometer to track a patient's temperature, a pulse oximeter to measure oxygen levels, a capnography machine for monitoring CO2 levels, and a sphygmomanometer to measure blood pressure.



Fig 4.4 PATIENT MONITORING SYSTEM WITH PATIENT VITALS

Patient monitoring systems play a pivotal role in modern healthcare, helping ensure patient safety and the timely delivery of appropriate care. They are continuously evolving with advances in technology, allowing for more accurate and comprehensive monitoring of patients' health status.

4.3 VENTILLATOR

A medical ventilator is a machine that helps your lungs work. It can be a lifesaving machine if you have a condition that makes it hard for you to breathe properly or when you can't breathe on your own at all. A ventilator helps to push air in and out of your lungs so your body can get the oxygen it needs. You may wear a fitted mask to help get oxygen from the ventilator into your lungs. Or, if your condition is more serious, a breathing tube may be inserted down your throat to supply your lungs with oxygen. Ventilators are most often used in hospital settings. A doctor or a respiratory therapist will control how much oxygen is pushed into your lungs by the ventilator.



Fig 4.5 VENTILLATOR

Face mask ventilators are non-invasive, while mechanical and tracheostomy ventilators are invasive and work via tubes that a doctor inserts through a hole in the neck that leads to the trachea, or windpipe.

There are several ways a person can receive ventilator support. These include:

- face mask ventilators
- mechanical ventilators
- manual resuscitator bags
- Tracheostomy ventilators

4.4 OPERATION THEATRE

An operation theatre, also known as an operating room (OR), is a specially designed room within a hospital or healthcare facility where surgical procedures are performed. These rooms are equipped with advanced medical equipment and are staffed by a team of healthcare professionals, including surgeons, nurses, anaesthesiologists, and surgical technicians.

Key features and components of an operation theatre typically include:

1. **Sterile Environment:** Maintaining a sterile environment is crucial to prevent infections during surgery. The OR is equipped with systems and protocols to minimize the risk of contamination. This includes specialized ventilation systems, sterilized equipment, and strict hygiene procedures for the surgical team.
2. **Surgical Equipment:** Operation theatres are equipped with a wide range of surgical instruments and equipment, such as surgical tables, lights, anaesthesia machines, and monitoring devices. These tools are essential for conducting various types of surgeries.
3. **Lighting:** Powerful and adjustable surgical lights are positioned over the operating table to provide optimal illumination of the surgical field. This allows the surgical team to work with precision and clarity.
4. **Anaesthesia Machines:** anaesthesia machines are used to administer anaesthesia to the patient, keeping them unconscious and pain-free during the procedure. Anaesthesiologists are responsible for monitoring the patient's vital signs throughout the surgery.



Fig 4.6 OPERATION THEATRE

5. **Monitoring Equipment:** Operation theatres are equipped with monitors that continuously display the patient's vital signs, such as heart rate, blood pressure, oxygen levels, and ECG (electrocardiogram) readings. This helps the medical team assess the patient's condition during surgery.



Fig 4.7 SURGICAL INSTRUMENT

Overall, operation theatres are designed to provide a controlled and sterile environment where surgical procedures can be conducted safely and effectively. The layout and equipment in an OR may vary depending on the type of surgery and the specific needs of the medical team.

IV. CONCLUSION

In conclusion, my biomedical internship experience has been both enlightening and rewarding. I have had the opportunity to witness firsthand the impact of biomedical sector and healthcare on improving the lives of patients. This internship has reinforced my passion for biomedical science and healthcare, and it has given me a deeper understanding of the challenges and opportunities in the field. It has also strengthened my ability to work in a collaborative and interdisciplinary environment, where effective communication and teamwork are essential.

As I reflect on my internship, I am grateful for the knowledge and skills I have acquired, as well as the relationships I have built with my mentors. I am confident that the experiences gained during this internship will serve as a strong foundation for my future career in biomedical and healthcare. I also gained knowledge about instruments like ECG, Ultrasound, X Ray.

I would like to express my sincere thanks to my Teachers and Mentors for their unwavering support and guidance throughout this internship. Their mentorship has been invaluable to my professional development. This internship has been an invaluable stepping stone in my journey toward a career in biomedical science and healthcare. It has provided me with practical experiences that complement my academic studies and have deepened my commitment to making a meaningful impact in the field. I look forward to applying the knowledge and skills gained during this internship to my future endeavours in the biomedical field.

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