FEDERAL UNIVERSITY, NDUFU-ALIKE, IKWO, EBONYI STATE

STUDENT'S INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

A REPORT OF SIX (6) MONTHS STUDENT INDUTRIAL WORK EXPERIENCE

AT

FEDERAL TEACHING HOSPITAL, ABAKALIKI (FETHA)

BY:

NAME:	**DANIEL CHIDINMA**
REGNO:	**FUNAI/B.SC/14/1151**
DEPT:	**ANATOMY**
COURSE TITLE:	**SIWES AND SEMINARS**
COURSE CODE:	**ANA 371**
DATE:	**03-NOVEMBER-2017**

IN PARTIAL FULFILLMENT FOR THE AWARD OF A BACHELOR OF SCIENCE DEGREE (B.SC) IN ANATOMY

DEDICATION

This work is dedicated to all Anatomy students, especially those in Nigerian Universities who has taken the bold step to study this wonderful course; Anatomy.

ACKNOWLEDGEMENT

My heart felt gratitude goes to the almighty God for his love and enablement thus far. I also want to thank my lectures, especially Prof Uche Nwachi, Dr. Egwu, Mr. G.G Akunna, and Mr. Obaje for their wonderful impacts without which I would not be at this level and for helping me appreciate Anatomy. I also will not fail to acknowledge the role of my departmental SIWES coordinator, Ms. Itoro Oku George for being there. I also want to acknowledge my family especially my sister, Mrs. Esther Sunday for her ever available support both financially and morally. I want to say, may God bless you all in Jesus name.

TABLE OF CONTENTS

CHAPTER 1

1.0. INTRODUCTION

1.1 MEANING OF SIWES

SIWES, which means students Industrial Work Experience Scheme, is the accepted skill training program which makes up part of the minimum academic standard that has been approved in various degree programs for all the Nigerian Universities.

This scheme is an effort which seeks to create a bridge between the theory and practical classes on Agriculture, Medicine, management, Engineering and Technology and other professional educational programs in the tertiary institutions.

SIWES aims at getting students exposed to the machines, equipment, professional workers and method of safe guarding the work areas and workers in the industries and organization. However, SIWES is a cooperative industrial internship program that involves institutions of higher learning, industries, the federal government of Nigeria, industrial training fund (ITF) and Nigerian University commission.

1.2 OBJECTIVES OF SIWES

The student Industrial Work Experience Scheme has various objectives which is aimed at enhancing the various study areas of a student. These objectives include:

- To create a bridge between the gaps of theory and practical classes.
- To cause promotion of industrialization in Nigeria and avenue between the world of teaching and learning ,and industrial work with reference to a field of study.

- To get students exposed to the likely jobs they are to encounter after graduation.

To enlist and strengthen employers involvement in entire educational process of preparing university graduates for employment.

1.3 PHILOSOPHY OF THE ESTABLISHMENT (FETHA).

Federal teaching hospital Abakaliki has the main mission of restoring people's health, treating and curing people of different diseases.

As one of the famous hospitals in Nigeria, with experts, professional health workers and care takers, it fosters academic and skill acquisition programs. Also its location and environment is such that helps it actualize it main aim of restoring health.

1.4 HISTORY OF FETHA

Federal Teaching Hospital Abakaliki was established in the 1930s under the British colonial administration. Its name was changed from casualty control center to Abakaliki general Hospital and then to Federal Medical Center.

In 1973, FETHA already had a full complement of consultant staffs and was approved for the training of house officers.

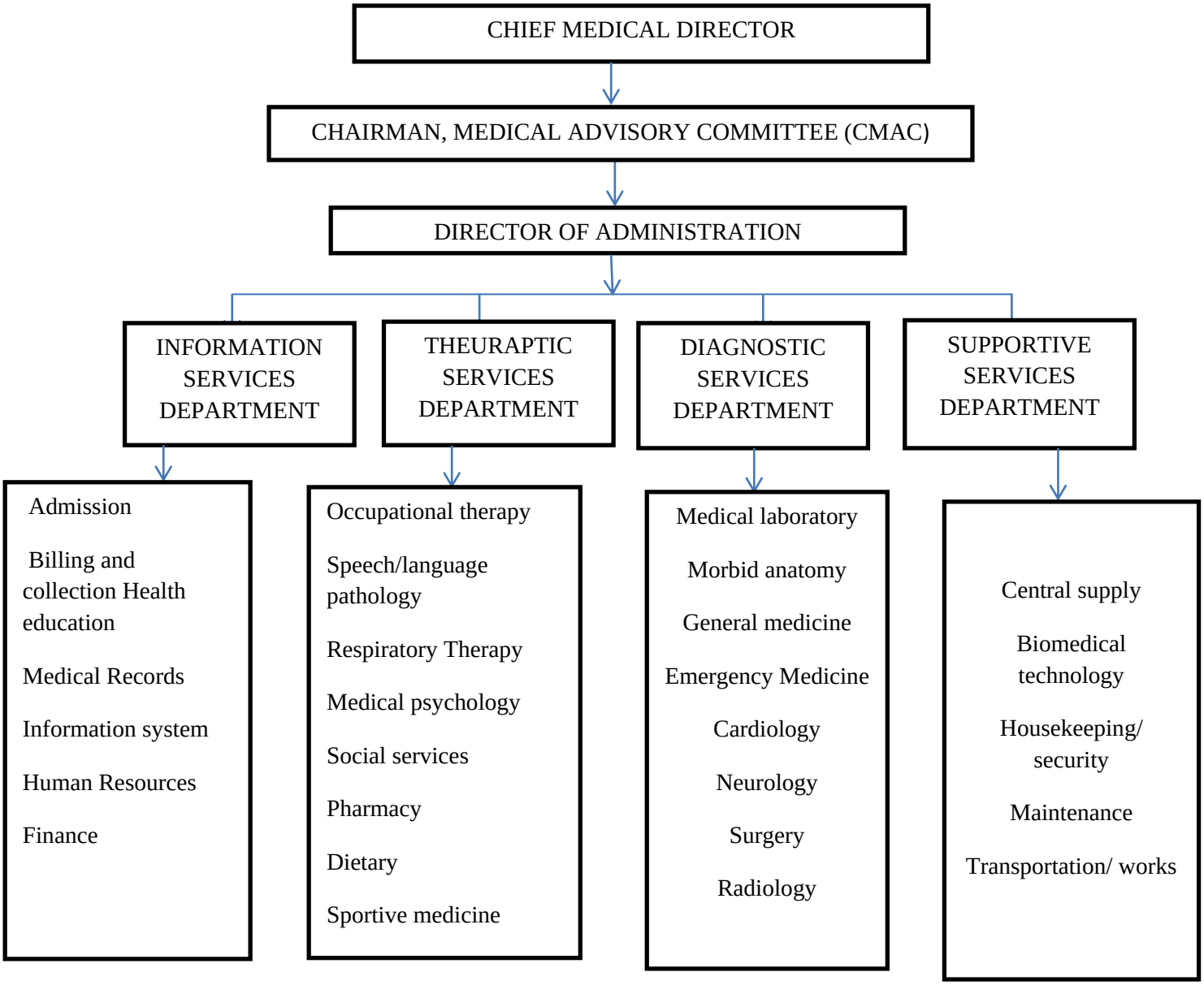
However, the establishment facilities became deteriorated and consultant staffs fell short of their duties as a result of splitting the East central into many states.

Following the agreement between the federal government and Enugu state Government in March 1991, the hospital became a federal medical center. With takeover, the hospital began to

make modest progress. This continued to progress when associate prof. Paul Olisaemeka Ezeonu, the then head of clinical services in medical center became the chief Medical director. Since then there has been a tremendous progress and growth in every department of the hospital. Out patients have risen to about 5000 monthly, accreditation for training of house officers have been restored.

During the election campaign tour of president Goodluck Jonathan in Ebonyi state in 2011, he made a promise to upgrade the federal medical center abakaliki to a federal teaching hospita.on December 2011,that promise was fulfilled. He further directed that Ebonyi state teaching hospital should be absorbed into into new mega Teaching Hospital comprising of FETHA 1 (former FMC) and FETHA 11 (former EBSUTH). In the same month, the hand over process was officially completed.

1.5 ORGANOGRAM OF FEDERAL TEACHING HOSPITAL, ABAKALIKI (FETHA)



CHAPTER 2

2.0. DIFFERENT DEPARTMENTS AND INSTRUMENTATION

These departments below were where we were posted during our industrial attachment. The departments are; Morbid anatomy and Radiology

2.1. MORBID ANATOMY DEPARTMENT

This Department comprises of the following units;

- Mortuary unit
- Histopathology laboratory unit
- Museum unit
- Autopsy unit

MORTUARY UNIT.

This unit is responsible for the preservation and storage of diseased bodies until their owners are ready to bury them. This unit is made up of different workers which includes; The head of unit, chief mortician, mortuary attendants, etc.

This unit also, is made up of different rooms used for different purposes. They include: the dressing room, embalmment room, reception room, autopsy room, storage hall, etc. These rooms are well equipped with the necessary equipment needed for the workers to carry out their job with ease. Such equipment includes trolleys, embalming tools, reagents, etc.

However, this unit is fully air conditioned so as to aid the evacuating reflux and actions of formalin reactions, and to avoid much inhaling of formalin/ embalming chemical.

AUTOPSY UNIT: This unit takes care of autopsy and it is mostly attached to the mortuary. Autopsy is a postmortem examination of a diseased body in order to find out the cause of death.

In this unit a special kind of doctor, called the pathologist performs the autopsy. After the autopsy the mortuary attendants reconstitute the dissected body. This unit is made up of rooms such as; the autopsy, room, convenience, pathologist room, etc. also, different equipment such as the autopsy tools and reagent are used in this unit to carry out the required jobs.

HISTOPATHOLOGY LABORATORY UNIT.

Histopathology unit is the unit responsible for the collection and processing of both histological and cytological tissues. This they do so as to prepare the tissue in such a way that it can be easily examined by the pathologist to ascertain the health condition of the tissue. These tissues are mostly processed into glass slides after microtomy.

This unit is made up of a very big hall with several machines and equipment such as automated tissue processor, embedding machine, oven, microtome, hot plate, water bath machine, burnson burner, tissue containers, etc. There are also different rooms in this unit such as reception room, storage room, and slide examination room. Workers found in this unit include; the head of unit (HOU), interns, pathologists and medical lab scientists.

MUSEUM UNIT:

This unit is responsible for the collection and preservation of pathologic organs, tissues and other parts of the body with pathology or abnormality, in such a way that it can be placed on a shelf and viewed by people for academic or research purposes especially for medical and anatomy students. This unit preserves these specimens using a transparent pot containing a special kind of preservative specially prepared for this purpose.

The different workers found in this unit are: the receptionist, curator, cleaner, and pathologists. There are also different rooms available in this unit such as the workshop, reception room, display room, etc.

In addition, there are many tools, materials and chemicals used in this unit to carry out a proper job, they include; drilling machine, Perspex sheet, kaiserling solution, etc.

RADIOLOGY DEPARTMENT

This department is responsible for imaging the internal organs using sound waves or radioactive rays. Different imaging modalities are used in this department to make this possible. Such imaging modalities include; ultrasound, magnetic resonance imaging, commutate tomography scan, etc. the type of imaging modality used, sometimes depends on the part of the body to be examined.

The images taken in this department is done by the radiographer and analyzed by the radiologist. The report is then sent to the doctor who used it to carry out treatments on the patient.

Workers found in this unit include; the Head of department, head of unit, radiographers and radiologists, etc. there are also different rooms found in this department. The imaging modalities form most of the equipment used in this department for it day to day activities

INSTRUMENMTATION

2.3.1. MATERIALS USED IN THE MORTUARY UNIT

- Embalming Table or Trolley- where dead bodies are kept for embalmment
- Scalpel and surgical blade- for making incisions
- Dissecting Forceps- for holding tissues during dissection
- Needle and Thread- for stitching tissues after embalmment
- Surgical Gloves- for protecting the arm from biohazards
- Face mask and eyes goggle - for protecting the face and eyes
- Rubber Tubule and Canola- for delivery or removal of fluids
- Boots- for protecting the leg and feet from biohazard
- Laboratory Coats and Aprons- for protection
- Embalming Tanks- contain embalming fluid
- Dyes- for dressing
- Cosmetics- for dressing
- Reagent Bottles- contain embalming fluid
- Reagents- mostly embalming fluids which includes :-
    - Isopropyl alcohol
    - Propylene glycol
    - Buffer formalin
    - Liquefied phenol
    - Water

- Mentholated spirit etc.

PICTURES OF SOME OF THE EQUIPMENT USED IN THE MORGUE

Source: morgue, Federal teaching hospital Abakaliki

SOME OF THE INSTRUMENT WE USED IN THE MORGUE

2.3.2. INSTRUMENT USED IN HISTOPATHOLOGY LABORATORY

- Paraffin wax, used for embedding specimen
- Microtome, used for sectioning tissues
- Glass slides, used for mounting tissues
- Saw,knife,surgical blade and wooden board ,used for grossing
- Tissue containers, used for fixing of tissues
- Bunsen burner, used for melting wax

- Refrigerator, used for cooling of embedded tissues
- Hot air oven, used for melting paraffin wax and for impregnation
- Automated tissue processor, used for routine tissue processing
- Embedding marching, used for casting of tissues into the paraffin wax.
- Staining rack ,used to hold glass slide during staining
- Microscope, used for examining the slides.

WITH CONTAINERS

2.3.3. INSTRUMENTS USED IN THE MUSEUM

- Workmate: This is a bench used for construction purpose
- Perspex sheet: This is a transparent glasslike sheet used for pot construction
- Perspex cutter: this is an instrument used for cutting the Perspex sheet
- Saw: this is used for cutting Perspex
- Needle and thread:for stitching the tissue or organ to be potted the center plate
- Weight: this is a heavy substance used for pressing on the pot under construction
- Perspex cement, for gluing the Perspex sheets
- Drilling machine, For drilling holes on the pot
- Fixative tank, for storing fixatives
- Tissue containers, for fixing the tissues
- File, for smoothening the rough edges of the pot
- Syringe with needle, for filling the pot

- Shelves, for displaying the prepared pot containing the tissues

PICTURE OF SOME OF THE INSTRUMENT

Source: museum, federal teaching hospital Abakaliki

2.3.4. INSTRUMENTS USED IN RADIOLOGY DEPARTMENT

- Commutate tomography scan
- Magnetic resonance imaging
- Ultrasound

- Ultrasound gel, used for rubbing on the part to be imaged
- Imaging bed, where the patient lies down
- X-ray detector, for detecting rays
- X-ray machine

2.3.5 OTHER RELEVANT EXPERIENCES

In addition to the theories learned in class, this industrial training has availed me the opportunity to not only learn how to do so many work which ordinarily I would not have learned from the class room but also to practice them without external aid

Some of these experiences include;

1. How to prepare a museum pot
2. How to prepare kersaline solutions and embalmment fluids
3. How to prepare a body for burial
4. Calculation of bills and filling of different documents in the morgue
5. How to differentiate between soft tissues and hard tissues on a radiologic film and how the different body structures appear in different imaging modalities

CHAPTER 3

3.0. TEST CARRIED OUT IN THE DIFFERENT DEPARTMENTS

3.1. MORTUARY SCIENCE

PRINCIPLE:

Embalmment is the art and science of preserving and storing the remains of human by the use of chemicals specially made for them to treat them in order to forestall decomposition. Embalmment is done for the purpose of making the remains to be in good physical condition suitable for public display at funeral, religious, medical or scientific occasions. Embalmment makes a deceased body look as lifelike as possible and thus makes it easier for the diseased relative to recognize the body and feel as if the person were still alive by encoding the past memory picture of the diseased.

Also, it also makes mourners not to come in contact with a smelly, decomposed body thereby preventing them from getting infections from the corpse.

TYPES OF EMBALMMENT

There are four types of embalmment. They include: arterial, cavity, hypodermal and surface embalmment.

1. Arterial embalmment: this process involves the infusion of embalmment fluid into the blood vessels usually through large vessels like the femoral artery and carotid artery

which has the ability to circulate the embalmment fluid throughout the whole body. This is done with a centrifugal pump .The interstitial fluids are displaced and blood is expelled trough the corresponding veins as the embalmment fluid is circulating.

2. Cavity embalmment: this is the replacement of cavity fluids with embalmment fluid. It is done with the use of trocar and an aspirator. During this process, a little incision is made just superior to the umbilicus, and from there, the trocar is pushed into the chest and stomach cavities to puncture the hollow organs and aspirate their contents, then their cavities are filled with concentrated formaldehyde. The incision earlier made is then closed with trocar button
3. Hypodermic embalmment: this is a supplemental type of embalmment in which a syringe and needle is used to inject embalmment fluid into the hypoderm. This helps the embalmment fluids to get to those parts that it could not reach during arterial embalmment.
4. Surface embalmment: this is another type of supplemental embalmment method in which the body is directly dipped in an embalmment fluid to preserve the superficial areas and skin surfaces of the corpse.

PROCEDURE

PRE-EMBALMMENT PROCEDURE

a. On arrival of a body in the mortuary, the body must be certified dead by a medical doctor and the pulsation, breathing and rigor mortis must be noted.

b. The body must be registered; and every necessary information concerning the deceased, such as cause of death, date of death and expected date of burial must be documented.

EMBALMING PROCEDURE

i. After documentation, the corpse is undressed
ii. The body is then washed and disinfected with disinfectant and germicidal
iii. The body is then laid in supine positon,flexing the hands, legs and arms to release rigor mortis
iv. an embalmment route is chosen and located (it could be femoral artery, carotid artery,etc)
v. An incision is made along the chosen route to locate the artery.
vi. An embalmment fluid is infused into the artery with the aid of a trocar or cannula connected to a tank
vii. The fluid is allowed to circulate within the body for some hours.
viii. Blood and other tissue fluid are drained through the corresponding vein

PREPARATION OF A BODY FOR BURIAL

This involves making a body which is ready for burial to look as lifelike as possible.

STEPS

Steps involved in doing this include:

- The body is disinfected thoroughly
- The eyes and mouth are closed properly (sometimes adhesive glue and/or needle and thread is used to achieve this)
- In the case of a male, shaving of the hairs around the mandibles may be required.
- The body is then rubbed with petroleum jelly to make it look shinny
- It is then dressed with clothes, socks, gloves and any other additional accessories as required by the deceased relative.

- Cosmetics may also be applied
- The body is then carried into a coffin and now ready to be taken to the place of funeral

3.1.1. AUTOPSY

PRINCIPLE

An autopsy is a thorough medical exam of a body after death done to learn about a disease or injury or to find out the cause of death of a person or how a person died.

It is done by an expert; in examining body and tissue fluids, called a pathologist. Autopsies are sometimes performed in academic institutions _for research and teaching purposes.

Forensic autopsy is performed to decipher if death was an accident, homicide, suicide, or a natural event.

Before an autopsy can be carried out, the permission of the next of kin of the deceased may be required. After the autopsy, the body is then reconstituted by stitching.

PURPOSE OF AUTOPSY

The following are the purpose for which autopsy is carried out

- To ascertain the cause of death which may be as a result of unknown medical problem
- To clarify the questions about the sudden death that appears to be from natural cause.
- To find out if there are genetic problems that family members may also be at risk for.
- To sort things out when the cause of death could affect legal matters
- To find out why death occurred without warning during a medical procedure or experimental treatment.

TYPES OF AUTOPSY

There are four major types of autopsy. They include the following

1. Forensic autopsy: this is a type of autopsy that is done to find out the cause and manner of death of a person. It is done as prescribed by the law applicable to it, in cases of violence, sudden death without medical assistance or during medical procedure.
2. Clinical autopsy: This autopsy is done for research purposes or to diagnose a particular disease outbreak.
3. Anatomical autopsy: this is the type done by anatomy or clinical students for the purpose of study.
4. Visual or medical imaging autopsy: this is done using radiologic imaging modalities such as the magnetic resonance imaging and computed tomography.

PROCEDURE

- The body is received in the examiner hall
- Proper documentation is carried out
- The physical appearance of the body is noted
- The picture of the deceased is taken
- The body may be embalmed or subjected to examination immediately, depending on the choice of the pathologist
- A coroner must be issued by legal authorities before the commencement of autopsy

There are two examinations that the pathologist conducts during autopsy. They are

a. External examination
b. Internal examination

EXTERNAL EXAMINATION

This type of examination is mostly conducted by anatomical pathologists who will help the pathologist to reconstitute the body after autopsy.

PROCEDURE

a. The body is received
b. Photo of the body is taken
c. The cloth colour and type is noted
d. The body is undressed
e. The body is disinfected, cleaned and weighed
f. The height, hair colour, eye colour, foot color and facial appearance are noted
g. Any visible form of wound is noted
h. A radiologic image may be taken to review invisible form of wound
i. Deductions and conclusions are made based on the findings of the pathologist.

INTERNAL EXAMINATION

When carrying out internal examination, the following steps are undertaken.

a. all the other procedures during external examination are taken
b. A plastic or rubber brick is placed on the posterior part of the, letting the arm and the neck to lie posteriorly while the chest is pushed anteriorly.
c. A y-shaped incision that is deep and large is made starting from the top of the shoulder and running down to the chest to meet at the inferior part of the sternum. This is mainly done to view the visceral and hollow organs.
d. a T-incision is made from the tips of both shoulders, in a horizontal line across the clavicles to meet at the middle of the sternum

e. a vertical but single cut is made from the middle of the neck, extending to the region of the pubic bone making deviation laterally to the navel
f. Scalpel is then used to flip the muscles to expose the visceral and hollow organs.
g. the viscera and hollow organs are then exposed and and examined
h. Deductions are made based on the findings and conclusion.

RECONSTITUTION OF THE BODY

The whole organs brought out during the autopsy must be returned to the body after the autopsy unless permission is given by the deceased relations to retain any organ for further research and /or investigation.

Due to the nature of work done on the body during autopsy, the chest cavity becomes flap, the skull is missing and the face becomes distorted. for this reason the internal body cavity is lined with cotton wool, the organs are placed in plastic bags(so as to avoid leakages) and returned into the body cavity. The skull is stitched back in place and the chest flaps are stitched back in place.

With these, the body is restructured such that the deceased relatives would not discover that any of such things were done to the deceased, during funeral services.

3.2. HISTOPATHOLOGY LABORATORY UNIT

3.2.1. TISSUE PROCESSING

PRINCIPLE

Histopathology this is the microscopic examination of tissues so as to study its disease condition or manifestation. Therefore, unlike histology which studies normal tissues, histopathology studies abnormal tissues. This examination is done on tissues got from biopsy. it is done by the pathologist, after the tissues have been processed and mounted on glass slides. Some of the tissues that require this examination include; cancerous tissues, fibroid tissues, etc.

This is done in order to find out the state of the tissues and the possible cause of the disease. The report or findings got from this examination provides diagnostic information which is later forwarded to the physician for further treatment and medication of the patient involved.

AIMS OF TISSUE PROCESSING

The main aim of processing a tissue is to remove water from the tissue and replace it eventually with a medium which allows sections to be cut from the block, which is usually paraffin wax. Biological Tissues to be cut are supported in a hard matrix to allow for sufficiently thin sections typically 5 micro meters, 1mm for light microscope and 80-100nm for electron microscope.

When tissues are processed, they are rendered to more optical densities which in turn increase the differential visibility when viewed on a microscope.

PROCEDURE:

Tissue processing has two methods which include; the routine method and the rapid method. Whichever method to be used, there are various procedures which must be undertaken in order to arrive at the desired result. These procedures to be followed are as follows:

RECEPTION

Whenever a tissue arrives in the unit, the following are checked:

1. To note whether the specimen is for histological or cytological examination.
2. To make sure that the container is properly and clearly labeled and accompanied by a completed request form that corresponds with the label on the container.
3. To note whether the specimen is in the right fixative or not. If it is, whether it is enough for the specimen in the container. After this is done,
4. the specimen is assigned an identity which will remain throughout the processing period
5. Then the specimen is registered using its identity earlier assigned.
6. The tissue specimen is then allowed to be in the container with the fixative till grossing time.

GROSSING:

This process involves the macroscopic view of the specimen. During this process, the specimen is weighed, measured, the color, texture and any adjoined tissue is observed and noted. After this,

the medical doctor or pathologist in charge uses a surgical blade or knife to cut out the suspected areas of the tissue having the pathology.

FIXATION:

Fixation is the next step after grossing. it involves the preservation of the tissue and its cellular component such as the nucleus, mitochondria, etc from degradation. This preservation is done using chemical fixatives such as formal saline.

10% formal saline is commonly used. Its constituent include; common salt, formaldehyde and water. the tissue is completely fixed in this fluid for a period of about 24hours.

AIMS OF FIXATION

i. to prevent autolysis and putrefaction
ii. to stop any shrinkage or swelling of the tissue
iii. to restore the cellular component
iv. to render the tissue receptive to stains

CHARACTERISTICS OF A GOOD FIXATIVE

- it should be able to penetrate the tissue and cell, rapidly, evenly and deeply
- it should prevent distortion from any subsequent reagent used subsequently
- it should be able to impact a suitable hardness and texture to allow for easy sectioning
- it should not be toxic, inflammable or corrosive
- it should allow for long term storage of specimen

DEHYDRATION:

This process involves the removal of water from the tissue. The tissue is passed through a progressive sequence of alcohol media which ranges from 70% to 90% and then to 100% (known as absolute); it is passed then, from absolute to absolute ii and then to absolute iii at the interval of two hours each. Dehydration is effectively done with a reagent that is miscible with water and ethyl alcohol serves as the best reagent for this purpose.it has the advantage of not being poisonous.

Other dehydrating agents include; rebutanol, methylated spirit, isopropanol, etc. acetone also can be used as it is cheap to get but volatile.

To check for the presence of water in a tissue bath, a small quantity of dried copper sulphate is added. If water is present, it turns tinge of blue. Then it means that the alcohol should be replaced for proper dehydration

CLEARING

This is also called de-alcoholization. In this process, the tissue is passed through a progressive sequence of xylene solution, that is; xylene i, xylene ii and then to xylene iii at the intervals of

two hours each. Xylene is miscible with alcohol. The solution becomes an ante-media because it clears the alcohol in the tissue.

EMBEDDING:

This involves casting of tissue into a molten paraffin wax and allowing it to set so as to enable it to be cut into sections. an embedding mould is used to receive the molten wax which is usually heated to 2 degree Celsius ; then the tissue is buried into it in such a way that the part to be sectioned is facing up and then allowed to solidify ,forming a block.

The mold to be used could either be Elkhart's mold which is l-shaped metal mold or plastic trays which are consist of disposable plastics mainly for conventional busy laboratories.

After the wax cools on the mould, it is removed from it and cut into tissue blocks (depending on the number of tissue pieces present in there).

TRIMMING:

The tissue block, with the help of a hot knife or spatula, is attached to a wooden block. When this is done, there could be excess wax that does not align to the wooden block. This excess wax is trimmed off also with the help of a hot knife to make sure that the wax forms a four sided prism with the wooden block.

3.2.2. SECTIONING:

This is the process which involves cutting the tissues into thin sections. This is done using a microtome. The microtome is adjusted to get the desired thickness of sections. The knife of the microtome are adjusted from 5-10u, the anti-roll plate is set to be parallel to the edge of the knife.

The temperature in the chamber is allowed to equilibrate by closing the cabinet for 22-23 minutes. After that, the sections are cut slowly but steadily but some hard tissues are cut off by fast stroke, making the tissue sections to move smoothly underneath the anti-roll plate.

After sectioning of the tissue, it is placed in a 20% alcohol; from there it is transferred into a water bath where it is allowed to float. Then, a transparent glass slide is used to pick the tissues. The picked tissue is then placed on a hot plate in order for the remaining traces of wax to be dissolved and dried up.

3.2.3. STAINING:

This is the process of dyeing a sectioned tissue which already has been placed on a glass slide.it is done in order to increase its optical density ,thus making making it possible to study the physical features of the tissues , its relation and their constituent cells with a microscope. There are different types of dye for staining but the commonly used in FETHA is hematoxylin and Eosin (H & E)

PROCEDURES FOR STAINING:

i. De-waxing: this is the removal of paraffin wax from the slide. This is done because if there is any trace of wax on the slide, there will not be proper staining of the tissue as wax is not permeable to stains/dyes. The final removal of wax from the slide is done by immersing the slide into two series of xylene for 2-3 minutes each.

ii. Removal of xylene: xylene is removed with absolute alcohol since it is not miscible with low grade alcohol. in doing this , the glass slide containing the sectioned tissue is immersed in absolute i and absolute ii for 1-2 minutes each.

iii. Rehydration with lower alcohol: this involves the gradual hydration of the suctioned tissues on the glass slide with lower alcohol. The tissue is immersed for 1-2 minutes in in 90% and 70% alcohol to prevent the possibility of diffusion current which could bring detachment and damage to the sectioned tissue.

iv. Rehydration with water: this involves immersing the sectioned tissue with distilled water or tap water, thereby making the tissue ready for staining.

v. Haematoxylin solution is then used to stain the tissue by immersing the tissue section in it for about 25minutes, after which the tissue is rinsed in tap water to remove excess stains.

vi. The tissue is then differentiated in 1% alcohol for 3minutes.

vii. then the tissue section is transferred to eosin and allowed to stay there for about 15 minutes

viii. The sectioned tissue is then rinsed with water and dehydrated with absolute alcohol.it is now allowed to dry.

3.2.4. MOUNTING:

When stained tissues are not mounted, they will not show a clear detail of the tissue when viewed on the microscope. This is due to the difference in the refractive index of glass

Slide, air and tissue component.

Mounting is done with a transparent medium which has a refractive index closer to that of a glass slide.it is necessary as it also protects the section against physical injuries like scratching.

Mounting is done with a fluid called DPX which acts as a glue.it is smeared on the point of the glass slide containing the stained tissue and then covered with a cover slip.

3.3. MUSEUM UNIT

The museum unit is a branch of morbid anatomy department of FETHA that deals with the collection, preservation and presentation of tissues for the purpose of research or study. In this unit pathologic tissues (sometimes, those of rare cases) which may be got through surgery or other medical procedures are preserved so as to help the upcoming generation to learn from them. Therefore, it is a pathology museum.

However, for there to be proper functioning of this museum, there must be workers. So, in the museum you will find the pathologist and curator. The curator prepares the pot containing the tissues and keeps them on shelves. Also the curator has the responsibility of showing people around the museum. The pathologist reviews the clinical condition of the tissue another. Worker that is very important in the museum is the receptionist.

OBJECTIVES OF THE MUSEUM

i. To preserve and display tissues in pots that can last for so many years for the purpose of study and research.
ii. To create a tourist avenue which can in turn yield revenue

PROCEDURE:

In the museum, specimens are made to undergo the following procedures before they can be fully displayed as museum specimens. The steps are as follows:

i. reception
ii. preparation
iii. fixation
iv. restoration
v. construction of tissue pot/jar
vi. preservation
vii. presentation

RECEPTION:

This involves how the tissue is received in the museum. When a tissue is received, its details are recorded in the reception book. it is then assigned a number followed by the year of reception. This number does not change even when the specimen has been catalogued.it is usually written with an indelible ink on a label which is then attached to the specimen.

PREPARATION:

This procedure involves making sure that the specimen is put in pace before fixation. this is done by trimming the specimen (if need be) and with the use of a blade, expose the parts needed to be displayed.

FIXATION:

Fixation is the procedure used to preserve the tissue and its cell constituent as lifelike as possible. It does this by forestalling autolysis and putrefaction.

In the museum, the fixative used is formalin based which are derived from kersalin and his modifications. Kersalin solution include; kersalin i, kersalin ii and kersalin iii. These solutions are made up of different constituents which make them unique in their actions. kersalin i solution is made up of the following;

Formalin 400ml

Potassium acetate 60g

Potassium nitrate 30g

Distilled water to make up to 2liters.

Specimens are fixed in large containers which can be enough for the specimen coupled with 3-4 times volume of the fixative to be used and they are stored in kersalin i for about one month, depending on the size of the specimen.

RESTORATION:

The specimen are likely to lose their natural colour during fixation and this can make the specimen to look dull and may be mistaken for another (in a case where the person viewing it has always done so in pictures) . So, as a result, there is need to bring back the normal color of the specimen to achieve the aim of preserving as lifelike as possible. This is where restoration comes in.it is done by immersing the specimen in kersalin ii solution. Before this, the specimen is removed from kersalin i, washed in running water, then transferred to 90% alcohol for 10 minutes to 1hr (depending on the size of the specimen). The specimen stays in kerasalin ii for about 1.5hrs.it is the presence of ethyl alcohol in kersaline ii that helps restore the colour of the specimen.

3.3.1. CONSTRUCTION OF TISSUE POT/JAR

In the museum unit, preservation and presentation of specimen can not be complete without the preparation of a tissue pot.it is in this pot that the specimens are preserved and presented for people to view.

In the preparation of the pot, proper care must be taken, considering the size of the tissue to be preserved in other not to make a pot to small or too big for the specimen. The following steps are taken in the initial stage of preparing the tissue pot for the museum;

1. Taking of rough measurement: the curator measures the length, width and breadth of the tissue.
2. With the measurement of the tissue, the Perspex sheet is also measured with a meter rule and cut out using a Perspex cutter.
3. after cutting ,the top and base cover of the pot are got, the center plate (usually about 2 inches less than the length of the pot)for attaching the specimen is got, the two width and breadth of the pot are also got.
4. With the aid of a work bench, the two breadths are adhered together using Perspex cement which is applied at their edges, after cleaning the surface of the sheets with chloroform.
5. For proper adhesion, a weight is placed on the pot on process, and allowed to stay for some hours.
6. The same procedure as in 4 and 5 above is done to the other side of the pot.
7. Having done this, the base of the pot (which later forms the bottom) is fixed with the Perspex cement and a weight also, is placed on it and allowed to adhere properly
8. at this stage, the pot is checked for leakages by washing it clean and filling it with water and allow it to stay for some hours (preferably overnight).if any leakage is discovered, that point where it is discovered is cleaned with a chloroform and a smeared with a Perspex cement.

9. A drilling machine is used to drill holes on the center plates earlier got. It is through these holes that the specimen can be fastened to it.
10. fastening of the tissue to the center plate is done using a needle and twine.it is fastened so tightly to avoid swinging when placed inside the pot and filled with fluid
11. Stoppers are fixed at strategic points at the edges of the pot, to hold the center plate in place. It is fixed considering the size of the tissue and in such a way as for the tissue not to be in contact with the wall of the pot when placed inside the pot.
12. The tissue which has been fastened to the center plate is then placed into the pot.

Filling jar using syringe and needle

deral teaching hospital Abakaliki

13. **Preservation:** the pot is then filled with mounting fluid to about 80% of the pot. The mounting fluid is also called purvertaft-kersaline iii. It has the following composition

Formalin	5ml
Glycerol	300ml
Sodium acetate	100g
Distilled water	to make up to 1L

14. the pot is then covered with its top by the use of Perspex cement, a weight is placed on it for proper adhesion
15. After that, the pot is turned upside down and checked for leakage once more.it is at this point that the top becomes the base.
16. Two holes are drilled at the edges of the top of the pot with a drilling machine.
17. With the use of a needle and syringe, the remaining 20% of the pot is filled with mounting fluid. The pot is then left overnight
18. Air bubbles are checked for and if present, are expelled through the drilled holes

19. After expelling the air bubbles, the holes are covered with Perspex rods (got from Perspex sheet) using Perspex cement and chloroform.
20. the Perspex rods are cut and the edges of the pot are smoothened with a file

PRESENTATION:

This is the process of displaying the pot for the public to see.

A label containing the details of the specimen is attached to the pot with glue. This is done for easy recommendation and accession. The pot is then placed on the shelf.

Shelves with presented tissue pots

3.4. RADIOLOGY DEPARTMENT

Radiology department is a medical department in FETHA that specialize in the use of imaging to diagnose and carry out treatment. Medical imaging is carried out by a radiographer often referred to as a radiologic technologist. The radiologists are the ones responsible for interpreting the images and reporting their findings. This report is then transferred to the clinician who requested for the imaging, who then works with the report for the treatment of the patient.

There are various imaging modalities used in the radiology department to carry out imaging of the body. They include:

- x-rays
- ultrasound
- nuclear imaging
- hysterosalpingogram
- computed tomography
- magnetic resonance imaging
- angiography
- mammography

3.4.1. X-RAY

X-ray, also known as plain radiography, is a type of electromagnetic radiation which travels in a straight line casting objects on its paths. It is a very good imaging modality the bone.

PROCEDURE:

i. the patient is laid on abed

ii. the patient can lay on a supine position or asked to stay in a standing positon,depending on the plane of projection

iii. The x-ray can either b shot on AP or PA. in AP, the beam is shot anteriorly and detected posteriorly but in PA, the beam is shot posteriorly and dictated anteriorly

iv. the dictator machine is placed on anterior or posterior position depending on the plane of projection

v. the film is produced and interpreted by the radiologist

vi. The report is sent to the doctor that requested for it.

GENERATION OF X-RAY

X-ray is made up of two poles which are ;the anode and cathode inside a vacuum tube which has a high voltage built into it. The cathode is heated 2000 degree Celsius by a specific heating filament. Electrons are emitted by the cathode and accelerated by the electric field between the anode and cathode and hit the anode with a considerable amount of energy, where they induce electromagnetic radiation called-ray. The x-ray has a very high energy and the higher the applied voltage, the higher the energy.

However, the anode is made up of heat resistance disc covered with tungsten. The disc rotates quickly to disperse its heat along its circumference forming a focal track. The vacuum tube is surrounded by oil inside a lead - lined housing that features only a small opening for the escape of the radiation.

The generated radiation has a spectrum of energies only part of which can be used for imaging.

ATTENUATION OF X-RAY

X-rays, as they pass through a patient's body, are attenuated. There are two processes that play a role in x-ray attenuation. They are: absorption and scatter. With lower energy radiation

corresponding to lower exposure voltage, absorption dominates. With high energy corresponding to high exposure voltage, scatter is mainly responsible for attenuation. With irradiated body volume, the scattered radiation increases.

X-RAY DETECTION

X-ray can be made visible with a variety of detectors. Photographic film is the simplest detector. It is very sensitive to light .it can be used to achieve high spatial resolution and because of this, it is used in nondestructive testing of industrial materials such as pipelines, alloy oar car wheel. In order to expose film alone, a reasonable dose of x-ray is needed because film is much more sensitive to light than x-ray. A combination of film and intensifying screens that are made up of rare earth metals such as lanthanum, gadolinium and barium are used as gamma screen in diagnostic radiology.

3.4.2. COMPUTED TOMOGRAPHY

Computed tomography, also known as C.T scan, is one of the imaging modalities used in radiology department to image the body. It takes images of the body in slices. C.T is made up of two tubes which revolve round the patient with high dose of energy which is much more than that of x-ray. it has a window for a particular tissue and this gives it an advantage over other modalities.

PRINCIPLE: It makes use of high voltage to produce sophisticated 2-dimensional and 3-dimensional images which can be reconstructed with the machine.

PROCEDURE:

In computed tomography,

- the patient is laid on spiral tray of CT
- the x-ray tube is made to continuously rotate around the crano-caudal axis of the patient
- a beam of radiation passes through the body and hits a moving ring segment of detectors
- the beam of light that is incoming, is continuously registered, then the signal is digitalized and is fed into a data matrix considering the varying beam angulations
- The data matrix can then be transformed into output image.

3.4.3. ULTRASOUND

Ultrasound is an imaging modality that makes use of sound waves to image the body. Unlike, x-ray, it is ideal in imaging soft tissues. To differentiate between soft tissues and hard tissues using ultrasound, you will discover that soft tissues appear hyper-echoic while bone tissues appear anechoic. this is because bone tissues have a high content of calcium which absorbs sound and makes it difficult for sound to pass through them thereby creating no signal to be recorded as an echo.ultarasound is a very safe imaging modality for all people as it does not emit radiation unlike CT and X-ray, but converts electric energy to sound energy with a high frequency of sound wave

However, sounds wave are generated artificially by means of piezoelectric crystals which when connected to alternating current of ascertain frequency, vibrates and emit sound wave of the same frequency. On the other hand, if they are exposed to sound wave of a certain frequency, they will produce an alternating current of that frequency.

The crystal is brought into direct contact with the body if ultrasound gel is applied on the surface and the emitted sound waves spread through the tissues.

The tissues in turn, absorb, scatter or reflect them. With higher frequencies, absorption and spatial resolution increases.

3.4.4. HYSTEROSALPINGOGRAM (HSG)

This is an imaging modality used to examine a case of infertility in women.HSG works with the aid of a contrast media to picture clearly the fallopian tube and the uterus of the patient. Laxatives are given to the patient prior to the examination so that the uterus and the other organs overlying it can be seen clearly. The patient is also asked to drink water so as to make the bladder to be differentiated from the uterus since they are closely related.

When the contrast (mainly iodinated) is injected or taken through ingestion, it enters into the body of the woman and clearly outlines the fallopian tube and uterus and a fluoroscope based x-ray is used to image it to examine some conditions which are likely to cause the infertility. For instance, if the patient had a miscarriage(s), the uterus is examined to check if there is a tumour; if present, the severity is observed. Also, the presence of uterine adhesion and fibroid is also checked. When all these are checked, the radiologist can then write his report based on his observations.

More so, HSC is ideally performed a week after menstruation but before ovulation just to be sure that the patient is not pregnant.

3.4.5. MAGNETIC RESONANCE IMAGING (MRI)

MRI is the most complex imaging modality in radiology.it is used to image both the anatomy and physiology processes of the human body.it uses strong magnetic field to form images of the body.

Certain atomic nuclei have the ability to absorb and emit radio frequency when placed in an external magnetic field. Hydrogen atoms are most often used in generating detectable radio frequency signal that is received by antenna in close proximity to the part of the body that is being examined.

In the human body (especially in parts containing water and fat), hydrogen ions naturally exists.it is these parts containing fat and water that most MRI scanner maps and locates.

There are two sequences which MRI has. They are; T1 and T2. Water appears black in T1 imaging but white in T2. Fat, on the other hand, appears white in both T1 and T2.

PROCEDURE:

The patient lies inside a strong magnetic field, the hydrogen atoms present in the patients body is used to produce magnetic Resonance image, pulse of radio waves excites the nuclear spin energy transmission then magnetic field gradients localize the signal in space. Moreover, different contrasts can be generated between tissues based on the relaxation of the hydrogen atom, by varying the parameters of the pulse sequence.

3.4.6. ANGIOGRAPHY

This is an imaging modality used to image the blood vessels in radiology. In doing this; a radiologic element is given to the patient through injection. The element goes through the blood and outlines the entire cardiovascular system. Then a fluoroscope; a special kind of x-ray, is used to image the blood vessels, which then can be examined.

3.4.7. MAMMOGRAPHY

This imaging modality is specially used for imaging the breast. it is used in detecting cancers ,tumours and lumps in the breast. it uses a special kind of x-ray called soft tissue x-ray which has a low ionizing doze.

3.4.8. NUCLEAR IMAGING TECHNIQUE

This is one of the imaging modalities used in radiology to image the body. Its principle depends on the ability to emit radiation by the radioactive substance. In nuclear imaging technique, the patient to be examined is injected with a radioactive element, and the body imaged using a special gamma camera to detect the emitted radiation. The quality of the image got through this technique is usually low and it depends on the localization of the radioactive element used.

CHAPTER 4

4.1. CONCLUSION

The introduction of student industrial training by the Student Industrial Work Experience Scheme is a very good opportunity to the students of which its benefits cannot be over emphasized. It helps to bring to reality all that has been taught in class theoretically thus making a balance between the theory and practical aspect of the students learning.

It enhances the student's ability to work with different equipment and machines there by making the student to be able to be confident in the future while working in similar environment.

It also avails the student the opportunity to meet and interact with other students in related field of study from different schools ,and learn to work as a team in order to achieve a common goal.

Most importantly, the student industrial training is a preparatory ground for the student that helps them to learn to be disciplined in their attitude to work, respect and obey superior authorities thus apart from gaining the practical knowledge needed, but also being employable in the future.

So, the training is one that should not be separated from the student ever.

4.2. RECOMMENDATIONS

- With such a huge benefit got from this training, I therefore recommend that the federal Government through the industrial trust fund should put more effort in making sure that the students are funded to properly carry out their training. They should also send their representatives to invigilate and make sure that the students are really getting the adequate training in their various place of attachment.
- It is worthy of note that most students find it difficult to get a place to be attached for their training and the few places seen are mostly under-equipped so the Government should help, create industries and establishments that should be able to accommodate the students every year for their industrial training and also equip them properly to enhance the success of the students. When all of these are put in place, we the students will be better to make our country better also.