BOOK OF PROCEEDINGS

INTERNATIONAL CONGRESS OF THE HAEMATOLOGY AND BLOOD TRANSFUSION SCIENTISTS SOCIETY OF NIGERIA

HBTSSN 2020

MARCH 16TH – 20TH, 2020

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PREFACE

The Book of proceedings of the first international congress of the Haematology and Blood Transfusion Scientists Society of Nigeria is a compendium of the academic contents of the events that transpired during the congress tagged HBTSSN 2020 with the theme **Healthy Blood, Healthy Nation: The haematology Scientists perspective.**

It is a collection of papers presented from the 17th to 19th of March 2020 at the Hotel Presidential, Port Harcourt, Nigeria. The publication of this congress proceedings is meant to serve the following purposes:

- Providing a great place for participants to present their research findings, novel approaches or new methodology.
- Allowing researchers to engage with the research teams and community doing research on the same subject.
- Staging and spreading the new ideas to the scientific community.
- The HBTSSN benefits from publishing the proceedings as it creates awareness and adds value to our great society.
- Attracts more authors to participate in future conferences.
- It's a faster way of making your results available to the wider world
- Citable for academic appointments and promotions

This congress proceedings is having a unique ISBN number and is catalogued in the National Library. It comprises of three parts: 1) Keynote and plenary lectures. 2) Abstracts of original articles for oral and poster presentations and 3) Workshop papers on Building a successful research career in Haematology and Blood Transfusion

I wish to acknowledge the efforts of the Chairman of Scientific committee, Prof Osaro Erhabor and other distinguished members of the scientific committee for their diligence in reviewing the abstracts submitted to this congress. I also thank the speakers who made their papers available for publication. This is the maiden edition and we hope to improve in the subsequent editions. I sincerely wish that every participant will find this book of proceedings useful.

Prof Z. A. Jeremiah
President

Welcome...! Welcome...!! Welcome...!!!

Dear Colleagues and Friends
It is my pleasure to welcome all of you to HBTSSN 2020, the first International Congress of the Haematology and Blood Transfusion Scientists Society of Nigeria on behalf of the National and Local Organizing Committees.

The **Haematology and Blood Transfusion Scientists Society of Nigeria (HBTSSN**) takes an immense pleasure and feels honoured to welcome all the participants to **the ground breaking international congress-HBTSSN 2020,** held during March **16-20,2020,** at **Atlantic Hall, Presidential Hotel, Port Harcourt.**

HBTSSN 2020 is an international event, attracting global participant's intent on sharing, exchanging and exploring new avenues of haematology. Of special mention is the collaborative effort of the International Society of Blood Transfusion (ISBT) in supporting the workshop component of this congress. The Medical Laboratory Science Council of Nigeria (MLSCN), our parent also played a very supportive role that made this congress possible. This event includes Keynote speakers, plenary speakers, oral and poster presentations of original research works carried out by members and non-member and workshop papers on Building a successful research career in Haematology and blood Transfusion. There are other special sessions from sponsors that promises to be exciting to participants.

In this maiden ground breaking congress the theme **"Healthy Blood, Healthy Nation: The Haematology Scientists Perspective"** was chosen to emphasize the importance of promoting healthy blood as blood scientists and educate the populace about blood disease and impacts on the nation.

The aim of the **HBTSSN-2020** is also to promote quality research and real-world impact in an atmosphere of true international cooperation between scientists and researchers by bringing together the world class researchers, International Communities and Industry and haematology specialist scientists to discuss the latest developments and innovations in the fields of Haematology and Blood Transfusion.

Port Harcourt, City and capital of Rivers state, Southern Nigeria, is very cosmopolitan being the hub of the oil and gas industry in Nigeria. Her people have rich cultural heritage with array of beautiful dances and costumes and are friendly and very hospitable. The Conference venue, Hotel Presidential is within 5 minutes' drive to exotic lounges and bars situated within the government reserved area. Also, there are car hire services ready to take you on tour of different facilities. The Venue hosts a lot of tourists' shops and indoor sports facility for your relaxation. The venue is about 25 minutes' walk to Stadium Road which hosts a lot of affordable hotels and accommodation fit for budget.

We sincerely hope that **HBTSSN-2020** serves as an international platform for meeting researchers from around the world, widen professional contact and create new opportunities, including establishing new collaborations.

We trust that you will find this congress stimulating, informative and enjoyable. We wish you a pleasant stay in this historical and beautiful city of Port Harcourt.

Prof Z. A. Jeremiah. FRCPath, FIBMS,MNIM,FWPCMLS, MHBTSSN
President, HBTSSN

OUR SPONSORS

We gratefully acknowledge our sponsors for their generous support

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ABOUT THE VENUE: THE ATLANTIC HALL

Hotel Presidential is located in the heart of the Garden City - Port Harcourt 'Capital of Rivers State.' Being centrally situated within the business districts and the main shopping areas of the city, Hotel Presidential is an ideal choice for both leisure and business travelers. The hotel's five-star status is reflected through its 251 tastefully furnished and functionally equipped Rooms and 49 spacious Suites including Presidential, Luxury and Royal Suites for those who prefer that extra touch of luxury. The value of the Hotel is supplemented by our conference and banqueting facilities comprising of four Conference rooms, Royal Banquet hall, Main Banquet hall and the largest, the Atlantic hall with a capacity over 500 persons all of them just perfect for holding conferences, conventions, seminars, workshops, weddings and other events.

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CHAPTER 1: LECTURES

1.1 HEALTHY BLOOD, HEALTHY NATION: THE HAEMATOLOGY SCIENTISTS PERSPECTIVE: Prof. Anthony Ogbonna Emeribe, Ph.D, FMLSCN, Professor & Hon Chief Consultant Haematologist, UNICAL / UCTH, Calabar

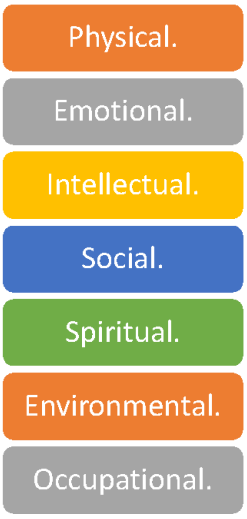
PRESENTATION OUTLINE

DEFINITION AND SCOPE OF HEALTH

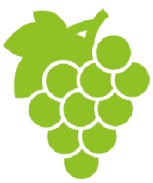
- Health is "a state of complete physical, mental, and social well-being and not merely the absence of disease" according to the World Health Organization (WHO). Physical is about the body. Mental is about how people think and feel. Social is about how people relate

- Better **health** is central to human happiness and well-being. It also makes an **important** contribution to economic progress, as **healthy** populations live longer, are more productive, and save more. Many factors influence **health** status and a country's ability to provide quality **health** services for its people

THE SEVEN DIMENSIONS OF WELLNESS



Wellness



Staying healthy physically can help you stay healthy emotionally too. If you're eating the right food and keeping fit, your body will be strong and help you to cope with stress and also fight illness. Eating well and exercising often when you're a teenager will also help you stay in good health later in life

WHAT ARE THE BENEFITS OF EATING HEALTHY?

- Weight loss.
- Reduced cancer risk.
- Diabetes management.
- Heart health and stroke prevention.
- The health of the next generation.
- Strong bones and teeth.
- Better mood.

- Improved memory.

Healthy Blood
Blood is a body fluid in humans and other animals that delivers necessary substances such as nutrients and oxygen to the cells and transports metabolic waste products away from those same cells. In vertebrates, it is composed of **blood** cells suspended in **blood** plasma.

Blood Basics
Blood is a specialized body fluid. It has four main components: plasma, red blood cells, white blood cells, and platelets. Blood has many different functions, including:
- transporting oxygen and nutrients to the lungs and tissues
- forming blood clots to prevent excess blood loss
- carrying cells and antibodies that fight infection
- bringing waste products to the kidneys and liver, which filter and clean the blood
- regulating body temperature
- The blood that runs through the veins, arteries, and capillaries is known as whole blood, a mixture of about 55 percent plasma and 45 percent blood cells. About 7 to 8 percent of the total body weight is blood. An average-sized man has about 12 pints of blood in his body, and an average-sized woman has about nine pints.

HAEMATOLOGY
Many people have undergone blood tests or donated blood, but haematology - the study of blood - encompasses much more than this. Doctors and Scientists who specialize in haematology (haematologists) are leading the many advances being made in the treatment and prevention of blood diseases

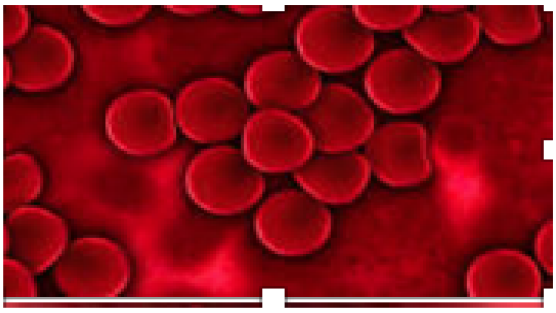
PLASMA
The liquid component of blood is called plasma, a mixture of water, sugar, fat, protein, and salts. The main job of the plasma is to transport blood cells throughout your body along with nutrients, waste products, antibodies, clotting proteins, chemical messengers such as hormones, and proteins that help

Red Blood Cell (Erythrocytes)
- Bright red colour
- Most abundant cell in the blood (40-45% of its volume)
- Biconcave disc with a flattened centre
- Production is controlled by erythropoietin
- Start as immature cell in the bone marrow and released after about 7 days
- Has no nucleus and is deformable
- Life span is about 120 days
- Contain haemoglobin
- Haematocrit is a common measure of RBC levels

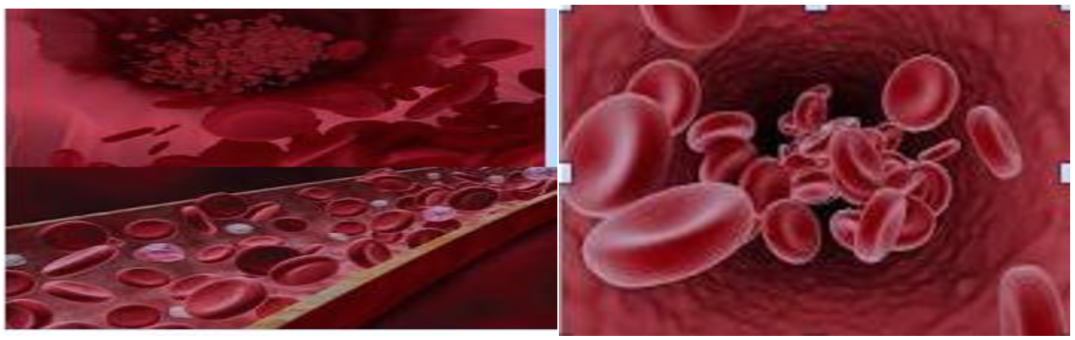
White Blood Cell (Leucocytes)
- WBC protect the body from infection
- Account for about 1% of total blood mass
- Most common immediate response cell is the neutrophil (55-70%) with life span < 1 day
- The other major type of WBC is the lymphocytes (2 main types)
- T lymphocytes help regulate the function of other immune cells and directly attack various infected cells and tumours
- B lymphocytes make antibodies that specifically target bacteria, viruses and other foreign materials

PLATELETS
Unlike red and white blood cells, platelets are not actually cells but rather small fragments of cells. Platelets help the blood clotting process (or coagulation) by gathering at the site of an injury, sticking to the lining of the injured blood vessel, and forming a platform on which blood coagulation can occur. This results in the formation of a fibrin clot, which covers the wound and prevents blood from leaking out. Fibrin also forms the initial scaffolding upon which new tissue forms, thus promoting healing.

RED BLOOD CELL



BLOOD IN CIRCULATION



COMPLETE BLOOD COUNT (CBC)

A complete blood count (CBC) test gives important information about the types and numbers of cells in blood, especially the red blood cells and their percentage (haematocrit) or protein content (haemoglobin), white blood cells, and platelets. The results of a CBC may diagnose conditions like anaemia, infection, and other disorders. The platelet count and plasma clotting tests (prothombin time, partial thromboplastin time, and thrombin time) may be used to evaluate bleeding and clotting disorders

A HEALTHY NATION

- Health is not just the absence of disease; it is a state of physical, mental, emotional and spiritual wellbeing. Fundamental to everything we do, health enables us to engage with life. Without health, we cannot easily share in loving relationships with our families and friends, fully participate in our chosen work, contribute meaningfully to our communities, or effectively compete on the global stage.

- We all make decisions that affect our health, for better or worse, every hour of every day. In order to encourage and support the right choices and improve the health of all there is a growing interest to create a new culture of health and wellbeing.

- Our National health care is designed to treat single events of disease and trauma. It does not help people become or stay healthy, and our society does not successfully foster healthy behaviors.

- This is aggravated by very poor health budgets (<6%)

- But for many, it's not that easy to adopt new healthy behaviors. In fact, our society often makes it hard.

- Some of the most common chronic diseases—obesity, diabetes, hypertension, heart disease, some types of cancer and asthma—are linked to behavioral and/or environmental risk factors. These conditions can be mitigated or avoided altogether if we made better choices about eating nutritious food, adopting healthy habits (non-smoking, etc.), building healthy relationships, living and working in less toxic environments, engaging in stress reduction, staying fit, and being purposefully engaged in life.

CREATING CULTURAL CHANGE

- While we all have a personal responsibility to care for our own health, creating a culture of health and wellbeing will require engaged leadership from all sectors of society. It can't be accomplished through the health care system alone.
- The cultivation of health starts at home with the everyday choices we make—how we live, what we eat and the way in which we care for each other. It involves our schools—what food is served to our children and what exercise opportunities they are afforded
- The design of our communities, the quality of our air and water, and the cleanliness of our environment all affect our health. Our health is further impacted by the decisions corporations make in what products they choose to offer and how they manufacture them.
- The influences that can cause illness and disease or health and wellbeing thread through our entire culture. We need to ensure these influences are beneficial

Sustainability

The health of the people, which is critical to the nation's economic and competitive future, should be treated as a sustainable resource. It should be developed and defended. For every major decision we face, we should ask: What impact does this decision have on health?

Benefits of Physical Activities

- **Low Risk of:**
  - Early death.
  - Coronary heart disease.
  - Stroke.
  - High blood pressure.
  - High cholesterol or triglycerides.
  - Type 2 diabetes.
  - Metabolic syndrome.
  - Colon cancer.
  - Breast cancer.

- **Prevention of weight gain**
  - Weight loss, particularly when combined with reduced calorie intake.
  - Improved cardiorespiratory (aerobic) fitness and muscular strength.
  - Prevention of falls.
  - Reduced depression.

RICHEST AFRICAN COUNTRIES 2020

- Many of the world's poorest nations are in Africa
- The largest components of the African economy are agriculture, trade, and natural resources and the African economy is expected to reach a GDP of $29 trillion by 2050.
- While there are several ways to compare the wealth of a nation, one of the best ways to measure is by taking a look at the **purchasing** gross domestic product – or GDP – of a nation
- This is the value of the goods and services that come from a nation for a period of one year. GDP does not consider the difference in the cost of living and inflation rates between countries as GDP per capita at purchasing power parity (PPP) does

THE TOP FIVE (5) WEALTHIEST AFRICAN COUNTRIES

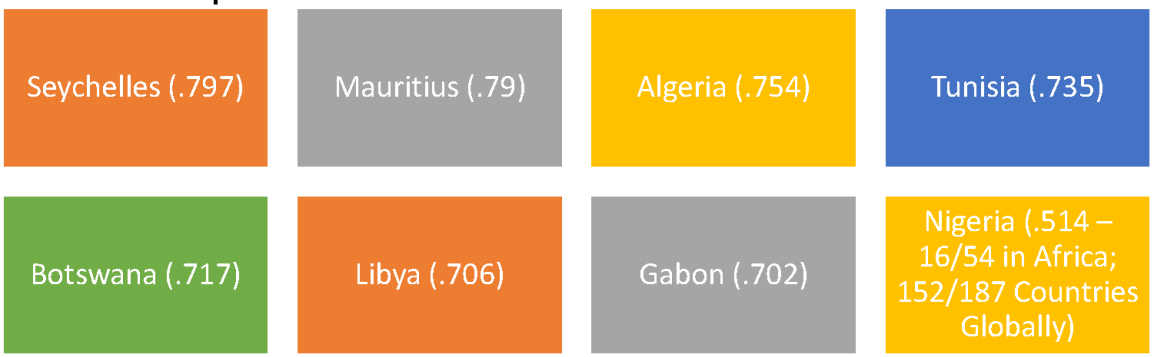
- The top five wealthiest African countries GDP per capita at PPP
- Equatorial Guinea ($34,865)
- Seychelles ($28,172)

- Mauritius ($21,628)
- Gabon ($19,266)
- Botswana ($18,146)
- Equatorial Guinea has the highest GDP per capita in Africa of $34,865, 56.50% of which comes from industry and 45.00% comes from services. With a relatively low population of 1.2 million, the GDP remains relatively high. However, income inequality is extreme in Equatorial Guinea. Despite Equatorial Guinea's economic growth, the country is ranked 138 out of 188 countries based on the Human Development Index by the United Nations.
- South Africa's GDP per capita is $13,403 and the South Africa GDP is $358.8 billion. The sectors of the South African economy are service, tourism, manufacturing, natural resources, agriculture and food processing, and business processing outsourcing.

Human Development Index (HDI)

HDI is used by quantifying countries development, such as life expectancy, healthcare, and education, and setting it on a scale of 0 to 1. HDI is set on a scale that ranges from 0 to 1, with four different classifications of low human developed (0-.55), medium human development (.55-.70), high human development (.70-80), and very high human development (.80-1.0)

The Most Developed Countries in Africa based on their HDI are



AFRICAN COUNTRY'S GDP PER CAPITA AND THE PERCENTAGE OF GDP FROM AGRICULTURE, INDUSTRY, AND SERVICES

Country	GDP Per Capita (US dollars)	GDP from Agriculture	GDP from Industry	GDP from Services
Equatorial Guinea	$34,865	2.50%	56.50%	45.00%
Seychelles	$28,712	2.50%	13.80%	83.70%
Mauritius	$21,628	4.00%	21.80%	74.20%
Gabon	$19,266	4.50%	44.00%	51.50%
Botswana	$18,146	1.70%	29.20%	69.10%
Algeria	$15,150	13.20%	36.10%	50.70%
South Africa	$13,403	2.80%	29.70%	74.20%
Egypt	$12,994	11.90%	33.10%	55.70%
Tunisia	$11,987	10.00%	25.90%	63.50%
Namibia	$11,528	6.60%	25.80%	67.60%

AFRICAN COUNTRIES' GDP PER CAPITA II

Libya	$9,792	1.30%	63.80%	34.90%
Morocco	$8,612	14.80%	29.10%	56.00%
Cape Verde	$6,942	7.90%	17.90%	74.20%
Angola	$6,813	10.20%	61.40%	28.40%
Republic Of The Congo	$6,707	8.90%	50.80%	40.30%
Nigeria	$5,927	21.60%	18.30%	60.10%
Ghana	$4,605	18.30%	24.50%	57.20%
Sudan	$4,580	39.60%	2.60%	57.80%
Mauritania	$4,474	22.50%	37.80%	39.70%
Zambia	$3,997	5.40%	35.60%	59.00%
Lesotho	$3,869	5.30%	34.60%	60.10%

AFRICAN COUNTRIES GDP PER CAPITA III

Ivory Coast	$3,857	17.40%	28.80%	53.80%
Djibouti	$3,567	2.80%	21.00%	76.10%
Kenya	$3,496	35.00%	17.60%	47.70%
Cameroon	$3,359	23.10%	28.00%	48.90%
Tanzania	$3,283	23.40%	28.60%	47.60%
Sao Tome And Principe	$3,208	11.80%	14.80%	73.40%
Senegal	$2,678	16.90%	24.30%	58.80%
Chad	$2,433	59.00%	14.10%	27.00%
Uganda	$2,352	24.50%	23.20%	52.30%
Zimbabwe	$2,277	12.50%	26.90%	60.60%
Benin	$2,219	25.60%	23.10%	51.30%
Mali	$2,169	40.90%	18.90%	40.20%

AFRICAN COUNTRIES GDP PER CAPITA IV

Ethiopia	$2,113	35.80%	22.20%	42.00%
Rwanda	$2,081	30.90%	17.60%	51.50%
Guinea	$2,039	19.50%	38.40%	42.10%
Burkina Faso	$1,884	31.90%	22.00%	46.10%
Guinea Bissau	$1,806	44.10%	12.90%	43.00%
Sierra Leone	$1,791	60.70%	6.50%	32.90%
Gambia	$1,686	20.40%	14.20%	65.40%
Togo	$1,612	28.10%	21.60%	50.30%
Comoros	$1,560	49.50%	11.80%	38.70%
Madagascar	$1,554	23.70%	16.00%	60.30%
South Sudan	$1,503	0.00%	0.00%	0.00%
Eritrea	$1,434	11.70%	29.60%	58.70%
Mozambique	$1,266	24.30%	23.00%	52.80%
Malawi	$1,172	28.60%	15.60%	55.90%
Niger	$1,153	44.30%	14.90%	40.80%
Liberia	$867	36.10%	10.50%	53.40%
Burundi	$808	40.00%	16.00%	44.10%
Dr Congo	$785	21.10%	33.00%	45.90%
Central African Republic	$681	42.90%	15.90%	41.20%
Somalia		60.20%	7.40%	32.50%

NIGERIAN BUREAU OF STATISTICS 2020

- January Key Indicators
- Unemployment 23.1%
- Underemployment 20.21%
- Youth Under / Unemployment 55.4%

Petroleum Motor Spirit/L (NBS 2020)

Nationwide Average N145.37

State with Highest Price:

Bayelsa N146.91

State with the Lowest Price:

Katsina N144.0

PERSPECTIVES OF HAEMATOLOGY SCIENTISTS

Receive and prepare	receive and prepare blood samples for analysis
Analyse	analyse blood samples using computer-aided and manual techniques
Review	review initial data that reveals, for example, white or red blood cell abnormalities
Make	make decisions on further haematological analysis
Liaise	liaise with other medical professionals to discuss patient treatment plans
Prescribe	prescribe specific types of treatment for individual patients
Cross	cross-match blood for use in transfusions
Investigate	investigate the biochemistry of blood clotting
Produce	produce quantitative data in the form of reports and provide key information to medical staff about a patient's condition
Help	help colleagues to interpret test results
Select	select appropriate techniques for different types of haematological analysis
Keep	keep accurate and detailed records.

At more senior levels, may need to:

Teach or train	Apply	Take	Liaise
teach or train MLS, medical students and other hospital staff, e.g. nursing and portering staff	apply for and manage departmental and/or laboratory finances and resources	take responsibility for working towards targets	liaise with haematology colleagues on a regional or national basis.

SCOPE OF CONSULTATIVE HAEMATOLOGY

Importance of Reference Range

- Haematology is a unique science in that its complexity is readily accessible via the examination of blood and marrow. The ease with which a complete blood count (CBC) may be obtained also leads to frequent observation of values which fall outside the reference range. Such perturbations may be the sign of something as ominous as acute leukaemia, or as inconsequential as the common cold
- That such changes might generate considerable anxiety, both for patients and providers, is not surprising given the plethora of life-threatening diseases that often manifest classic CBC findings.

Justification

- The purpose of the following slides is to awaken our thought process in responding to common queries and narrowing the differentials to that which is reasonable and probable

LEUCOPAENIA

- Neutropaenia
- Lymphopaenia
- Monocytopaenia

ANAEMIA: 3 Analytic tools for pathophysiology

- Standard haematologic indices, particularly mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH).
- Kinetic analysis seeking to determine if the underlying cause is a defect in red blood cell (RBC) production, an increase in RBC destruction (haemolysis), or blood loss.
- An awareness of patient demographics

THROMBOCYTOPAENIA

- *Platelet production is low*
- *Platelets are being rapidly removed from circulation*
- *Platelets are being sequestered*

PANCYTOPAENIA

- Combination of anaemia, thrombocytopaenia, and leucopaenia
- The blood counts may be low because the normal haematopoietic marrow has been replaced (fibrosis, infiltrative malignancy), is absent (aplastic anaemia), or is ineffective (MDS, vitamin B12 deficiency). Hypersplenism can also result in the rapid removal of cells from the blood, for example in the context of a malignant lymphoma.

LEUCOCYTOSIS

- Neutrophilia
- Lymphocytosis
- Eosinophilia

- Basophilia and monocytosis

ERYTHROCYTOSIS/POLYCYTHEMIA

- Technically, “polycythemia” refers to increases in RBC, WBC, and platelets, while “erythrocytosis” more specifically refers to increase in RBCs alone
- The distinction between absolute and relative polycythemia should be made. The former refers to a true elevation of the red cell mass, whereas the latter refers to an apparent increase in haemoglobin caused by a contracted plasma volume.

OTHER CONDITIONS OF INTEREST

- Thrombocytosis
- Pregnancy
- Bleeding
- Thrombosis - venous or arterial
- Immature cells on the blood film - nrbc; immature myeloid cells
- Lymphadenopathy
- Splenomegaly
- Monoclonal gammopathy

CONCLUSION

Haematology Scientists play a key role as watch dog for healthy blood of citizens which is a crucial indicator of healthy living and a healthy nation

Health is a crucial component of the Human Development Indices of any Nation

A call for Nigeria to attain the UN recommended Health budgetary allocation of 15% for developing countries from the current <6%

APPRECIATION

- Thanks for your attention
- Gracias
- Sanu
- Unu Emela

- Ekuse
- Merci
- Sosong

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- Most Developed Countries In Africa
- East African Countries
- Largest Countries In Africa
- North African Countries
- Poorest Countries In Africa
- Safest Countries In Africa
- West African Countries

1.2 PROFESSIONAL ETHICS: A NECESSITY FOR PRACTICE AND RESEARCH: - Dr. Tosan Erhabor, Registrar/Chief Executive Officer, Medical Laboratory Science Council of Nigeria, *Being an invited guest speaker at the first International Congress of Haematology and Blood Transfusion Scientists' Society of Nigeria (HBTSSN) at Hotel Presidential, Port Harcourt, Rivers State, Nigeria on Tuesday, March 17, 2020.*

OUTLINE

- Introduction
- The profession and the professionals
- Ethics
- Sources of Ethics
- The Essence of Ethics
- Professional Ethics
- Professional Ethics: A Necessity for Medical Laboratory Science Practice
- Research Ethics in Medical Laboratory Science Practice
- Major Ethical Issues in Conducting Research
- Conclusion

INTRODUCTION

- Let me express my profound gratitude to the organizers of this international congress of *Haematology and Blood Transfusion Scientists' Society of Nigeria (HBTSSN)* for inviting me to share my thoughts on this all-important topic, **"Professional Ethics: A Necessity for Practice and Research"**
- Medical laboratory science practitioners play a pivotal role in healthcare delivery, contributing over 70% of the information needed for clinical decisions on prevention, diagnosis, treatment and management of patients.
- Research is an integral component of medical laboratory science as it provides insight and possible solution into many health related challenges affecting man and the environment.
- It became more imperative for professionals to practice and conduct researches in accordance to lay down professional ethics.
- Professional Ethics is the moral bond that links a profession, the people it serves and society. Therefore, the need for Medical laboratory science practitioners to uphold high professional ethical values in practice and research cannot be overemphasized.
- The Medical Laboratory Science Council of Nigeria, has zero tolerance for unethical and substandard practice.

The Profession and the Professionals

- A profession is an assemblage of occupation which entails important services committed to serve the public in a special market relationship distinguished from a trade.
- An occupation becomes a profession when a group of individuals sharing the same occupation organize to work in a morally permissible way, or work to support a moral ideal.
- Members of a profession, set and follow special standards for carrying out their occupational work.
- These special standards are morally binding to "professed" members of the profession
- When the majority of members of a profession follow the standards, the profession will have a good reputation and members will generally benefit; if the majority of members violate these voluntary standards, professed members of a profession will be at a disadvantage.
- A professional is therefore a member of an occupational group who:
  - ✓ Accepts the profession's agreement to work in a morally permissible way (often expressed as a code of conduct) as determining in part the obligations of the role.
  - ✓ Exercises judgment in the performance of occupational task and follows relevant professional standards.
  - ✓ Sees other members, including those employed elsewhere, as peers/colleagues.

WHAT ARE ETHICS?

- Ethics give precise guidance and direction for action in concrete situation, and they require ethical reasoning.

Ethics are:

- A moral guide that governs the professional and personal conduct of all regulated members of an institution and communities to the public; they are the principles by which professional performance is adjudicated.
- Inspirational and value-oriented guidelines expressing the most honourable ideals to which professional should aspire.

SOURCES OF ETHICS

- **Authority**
  - ✓ Legislations such as Acts of parliament like MLSCN ACT 11, 2003
  - ✓ Governing Bodies such as MLSCN.

- **Responsibility and Accountability**
  - ✓ Integrity
  - ✓ Quality
  - ✓ Transparency of work
  - ✓ Compliance to regulations
- **Conscience**
  - ✓ The moral police who is always there to keep us unease when we make wrong decisions, and commends us when we make the right ones.

THE ESSENCE OF ETHICS:

Ethics seeks to fight;

- Falsehood in professional practice
- Professional incompetence and lack of self –improvement
- Violation of privacy and protection
- Lack of compassion
- Disrespect of persons
- Lack of interest in well- being of patient (Non- maleficence & Beneficence)
- Violation of Human rights
- Violation of Autonomy

PROFESSIONAL ETHICS

✓ Professional ethics define the profession's special relation to the market place where members earn livelihood in performing professional roles and in accepting certain standards.

PROFESSIONAL ETHICS: A NECESSITY FOR MEDICAL LABORATORY SCIENCE PRACTICE.

✓ The adherence to the professional ethics in Medical Laboratory Science Practice is a necessity which is not negotiable for all professionals. It includes;

Ethical Principles

- General principle – Ethics are applied for the best interest of the patient. Patient's welfare is chiefly important.
  - ✓ For instance: false positive results are as deadly as false negative results.
  - ✓ Internal Quality Control and External Quality Assessment are vital in Laboratory processes.
  - ✓ A trust relationship with patients
  - ✓ All procedures carried out on patient need informed consent of patient (e.g. Blood Transfusion Services)
  - ✓ Accurate reporting of laboratory results.
  - ✓ Ensure, as much as possible, correct interpretation of results for patient's best interest.
  - ✓ Ensure appropriate sample and records collection, storage and retention

  - **Respect**
  - ✓ Medical Laboratory Science Practitioners must value & protect the welfare and dignity of all individuals. We should be respectful, accessible, and cooperative with others (patients, colleagues, and other healthcare providers) to provide effective patient care.

  - **Professional Attitude and Behaviour**
  - ✓ Medical Laboratory Science professionals are honest, dependable and equitable

- ✓ We contribute to the development of the profession through collegiality, mentorship, self-development, and support of its institutions.

- **Professional Development**
- ✓ Medical Laboratory scientists enhance our own well-being and fitness to practice and increase our knowledge, skills, judgments, and attitudes through continuing education.
- ✓ We strive for excellence in our professional practice and conduct through life-long learning.

- **Accountability**
- ✓ Medical Laboratory Scientists are accountable for their actions, records and documents.
- ✓ We are ultimately responsible to God, then to patient, authorities, and society for safe and lawful practice, and the sustainable use of resources.

- **Confidentiality and Conflict of Interest**
- ✓ Medical Laboratory Scientists should understand and comply with applicable privacy legislation and policies regarding the collection, use, & disclosure of confidential information.
- ✓ We must recognize & reveal conflicts of interest, and resolve them in a manner which maintains the integrity of personal health information & protect the best interest of patient care.

- **Safety**
- ✓ Medical Laboratory Scientist must maintain a culture of safety (use of PPE etc.)
- ✓ We must practice in compliance with all current federal and state legislation for the protection of others with the intent to minimize the risk of harm.

- **Professional Responsibility**
- ✓ Promote excellence in the profession and practice within the scope of professional competence.

RESEARCH ETHICS IN MEDICAL LABORATORY SCIENCE

Research ethics expects that;

- ✓ When conducting research on human subjects, minimize harms & risk and maximize benefits; respect human dignity, privacy and autonomy; take special precautions with vulnerable populations; and strive to distribute the benefits and burden of research fairly.

Major Ethical Issues in Conducting Research

- Follow informed consent rules
  - ✓ When done properly, the consent process ensures that individuals are voluntarily participating in the research with full knowledge of relevant risk and benefits.
- Discuss intellectual Property Frankly
  - ✓ The best way to avoid disagreements about who should get credit and in what order in a research team is to talk about these issues at the beginning of a working relationship, even though many people often feel uncomfortable about such topics.
- Explore ethics resources
  - ✓ One of the best ways researchers can avoid and resolve ethical dilemmas is to know both what their obligations are and what resources are available to them.
- Respect confidentiality and privacy
- Discuss the limits of Confidentiality
- Adhere to federal and State legislations
- Think about data sharing before research
- Take practical security measures
- Understand the limits of the Internet

Conclusion

- ✓ We recognize self-regulation is a privilege which individual members of the profession merit through adherence to the code of Ethics and the standards of practice.
- ✓ As medical laboratory science professionals, we must strive to:
- ✓ Maintain and promote standards of excellence in performing and advancing the art and science of the profession
- ✓ Preserve the dignity and privacy of others
- ✓ Uphold and maintain the dignity and respect of our profession

- ✓ Seek to establish cooperative and respectful working relationships with other health professionals.
- ✓ Contribute to the general well-being of the community.
- ✓ Engage in continuous professional development

The active demonstration and commitment to these responsibilities throughout one's professional life is a necessity to successful practice of the profession.

THANK YOU

1.3 PROVISION OF SAFE BLOOD TRANSFUSION SERVICE IN AFRICA: MEDICAL LABORATORY SCIENTISTS ON CALL: Mr. Idris Saliu, Country Director, Safe Blood for Africa Foundation (Being a Sub-theme lecture at the 1st Haematology and Blood Transfusion Scientists Society of Nigeria HBTSSN) Congress March 2020)

Introduction

Africa is one of the six WHO Regions which consist of 47 countries with a population of over one billion that is responsible for 14% of world population. The African region is known to have high disease burden that requires blood transfusion. According to WHO, the percentage population with anaemia is 42%. The magnitude of the problem can further be appreciated when it is disaggregated amongst groups. Aneamia in the very population of 6 to 59 months is said to about 62%, women of child bearing age about 39% and preschool age's ranges from 42 to 92%. The drivers of blood need in Africa include trauma/road accidents, malaria, post-partum haemorrhage, and sickle cell disease. To improve the availability of safe blood and blood products, The World Health Assembly (WHA) and the World Health Organisation (WHO) and several Committees have adopted numerous resolutions and developed various documents since1975 to improve the availability of safe blood and blood products in Africa. WHO also provides 'technical and financial support to Member States to implement these resolutions and guidelines' The heads of state and governments of these of 'countries endorsed in 2015 a new Sustainable Development Goals (SDGs) along with the 2030 agenda for which access to safe blood and blood products is a key strategy for achieving health-related SDGs". **WHO** https://www.who.int/bloodsafety/en/WHA28.72.

Background

In 1975 46 out of 47 Countries of the WHO Afro signed the WHA Resolution WHA28.72. But blood transfusion has been practiced in Africa since the 1940s and reached rates comparable to the western world especially in the urban areas of some countries, soon after independence. But there was a post-independence gradual fall in blood transfusion services which continued to decline in both the adequacy of blood supply and the quality of service. WHO African Region adopted a Regional Committee Resolution AFR/RC44/R12 of 19 94 following the discovery of HIV/AIDS. This Resolution urged Member States to take urgent action to enact blood policies and mobilize adequate resources for the development of blood services based on the WHO Aide Memoire on Blood Safety.

The following WHO five key Elements of Blood Safety will used as our guide for this presentation

1. National structure and organisation
2. Voluntary Non-Remunerated Blood Donors
3. Testing and processing of all units collected
4. Rational clinical use
5. Quality Management program

The role of medical laboratory scientist in the implementation of the five thematic areas will be discussed.

1. **National Structure and Organization:** Nations are expected to establish well organised and uniform (standards of practice) based on political awareness and sustained commitment anchored in the national legislation. However National Blood services in Africa are diverse and variable. Inadequate funding takes the centre stage with weak infrastructure that does not fully support blood safety. There is generally limited political will and lack of legislation. In that regard, 2678 blood centres from 41 out of 47 countries currently provide reports to WHO out of which only 244 (9%) are standalone facilities. 37 (90.2%) out of 41 have national blood policy while 33 (80.5%) have developed strategic plan for implementation. National blood legislation has been developed in 20 countries (58.8%) although some are still in the process of becoming a national law.

2. **Voluntary Non-Remunerated Blood Donors:** It is expected that countries should establish a sound reliable stable and regular donor panel based on public awareness and donor education. In addition, low risk blood donor groups should be identified with trust and confidence in the national blood system. It is noteworthy that efforts are being made in this regard with the formation of Club 25 and other youth Clubs in several countries. However inadequate blood collection from Voluntary Non-Remunerated Blood Donors is still a common occurrence in most countries. Reports reaching WHO Afro in 2018 indicates that 4,899,913 were collected in the year which indicates arise in the performance of 2016. In an earlier report 82 countries of the world report collecting fewer than 10 donations per 1 000 populations. Of these, 39 countries are in WHO's African Region, 9 in the

Americas, 7 in the Eastern Mediterranean Region, 8 in Europe, 7 in South-Eastern Asian and 12 in the Western Pacific. All are low- or middle-income countries.36 countries report 9% deferrals out of 4646657 donations in WHO Afro region. The report indicated that 35 (85.4%) out of 41 countries prepare blood components out of which 73.3% are red cell concentrate, 17.4% fresh frozen plasma and 9.4% are platelet concentrates. Another interesting indicator is the inclusion of plasma derived medicinal products (PDMP) in the national medicines list of 22 countries (52.6%) out of 41. It is noteworthy that only one (1) country in the region is currently doing plasma fractionation.

3. **Testing and processing of all units collected:** It is expected that countries that establish national blood service compliment the service with scientific state of the art, nationally and internationally accepted, cost effective with every hand on deck (critical mass movement). The test algorithm should be appropriate and validated with required standard and specifications. All of these are in progress but at varying degree of level of test sophistication and transfusion of large quantity of whole blood. The testing of all donated blood for ABO and Rh blood grouping and antibody screening are generally done but in varying degree of sophistication from Tube to Gel and Automation techniques from country to country. Blood grouping in the region is generally well done except in 3 countries that do not perform forward and reverse grouping. Out of the 47 countries in the WHO Afro, 37 (78.7%) reported that their transfusing facilities perform pre-transfusion compatibility testing. Eleven (11) 23.4% reported on research activities for irregular antibodies while 17 (36.2%) reported on Rh and Kell blood group systems phenotyping. About 1, 287 adverse events were reported from 15 countries but only one (1) country reported on the detailed classification of the adverse events. There is a wide range of testing techniques and level of sophistication for transfusion transmissible infections (TTIs). Most countries test for the four WHO mandatory Transfusion Transmissible Infections viz HIV, Hepatitis B surface antigen, Hepatitis C and Syphilis. Rapid test are used in several hospital setting. It is cheap but of poor sensitivity in blood transfusion. ELISA and Chemiluminesance Assay are the commonest test strategy in the 244 standalone blood centres with antigen and antibody combination assays in some instances. A few centres use Nucleic Acid Test format. There is a massive short fall of 5,040,434 units of blood per annum in the region based on the WHO figure of 10 units of blood per 1000 population being the estimate for the year 2018. In 2013, the number of whole blood that were separated into component stood at 64% but a slight fall was observed in 2018 which stood at 63.4%. Pathogen inactivation or reduction is at various stages of experimentation in the WHO Afro region.

4. **Rational clinical use:** It is expected that national blood service develop Indication setting and decision taking on the use of blood components and alternatives as well as the rational use of both. However, funding and infrastructural support to make components for Appropriate Clinical Use of Blood (ACUB) is not supported by the shoe string budgeting in the region an easy task. There is inadequate education on ACUB. In this regard, only 19 countries reported on the number of blood units that are made available for clinical use in 2018.out of these, 22% were used in internal medicine department, 21% in Peadiatrics, 19% in gyaecology and obstetrics 12% in surgery, 6% in medical emergencies and 21% in other unspecified cases. The report also indicated that 35 countries collecting 4440880 have 27.3% were transfused as whole blood, 67.2% as red cell concentrate, 11.8% as fresh frozen plasma, 7.2% as platelet concentrate and 1.2% as cryoprecipitate.

   Less than 50% of the hospitals performing transfusions in WHO Afro have Hospital Transfusion Committee, about 47% have mechanisms to monitor clinical transfusion practice and less than 38% have a system for reporting adverse transfusion events.

5. **Quality Management programme:** The expectations are that Implementation of Quality Management irrespective of degree of development or progress in Quality System is based on human resources, capacity building, personal awareness, commitment, ownership and accountability. However, participation is External Quality Assessment is not fully in place in this region and Accreditation programmes are in process but are generally slow. 33 (76.7%) out of 43 countries in Africa that report to WHO-Afro regarding the number and proportion of centres using SOPs and/or participating in an EQAS for different TTIs.

Among the 1050 centres that reported on this parameter, a total of 283 centres (26.9%) were using SOPs while 201 centres (19.1%) were participating in EQAS for HIV, 82 (7.8%) for HBV/HCV and 56 (5.3%) for syphilis.

The AfSBT has organized an Accreditation Programme in the Region known as Step Wise Accreditation Programme (SWAP) 22 countries are currently participating in the programme but at different stages of the Step 1, 2 Certification and Step 3 Accreditation. To be specific, the following are the stages of different cluster of countries on the SWAP.

(1) Training and baseline assessment to be done 8 Countries
(2) Training and baseline assessment done 4 Countries
(3) Progress assessment to be done 3 Countries
(4) Progress assessment done 1 Country
(5) Formal assessment to be done 1 Country
(6) Follow up assessment planned 1 Country
(7) Facilities certified at Step 2 **(4 centres)** Assessments in **(3)** additional zones planned 1 Country
(8) Accredited at step three (3) **3 Countries**

B. Medical Laboratory Scientists on Call

Let me begin this section of my presentation with 6 definitions on Quality for ease of reference

Blood for Transfusion has been described as an actively therapeutic biological substance with perishable living bioactive agents obtainable from Health Human Donors that ensures patients safety. To date there is no known suitable/equivalent alternative. Griffith et al 1972 (Modified by Brian & Idris 2006)

Quality Control - QC refers to the measures that must be included during each assay run to verify that the test is working properly.

Quality Assurance - QA is defined as the overall program that ensures that the final results reported by the laboratory are correct.

The aim of quality control is simply to ensure that the results generated by the test are correct. However, quality assurance is concerned with much more: that the right test is carried out on the right specimen, and that the right result and right interpretation is delivered to the right person at the right time"

Quality Assessment - quality assessment (also known as proficiency testing) is a means to determine the quality of the results generated by the laboratory. Quality assessment is a challenge to the effectiveness of the QA and QC programmess.

Quality System: Refers to every step & activity needed to implement quality management which Includes an organisational / Institutional's structure, responsibilities, policies, procedures and resources established by top management to achieve quality.

Quality Management: All activities of the overall management function that determine quality, policy, objectives, implement them by means such as quality planning, quality control, quality assurance, and quality improvement within the system.

Quality Management includes training of laboratory staff, the use of standard
operating procedures (SOP), standard supply management, standard equipment management and supervision of peripheral laboratories/structures.

Medical Laboratory Scientist participates in all of the above thematic areas at different levels of responsibilities but with core responsibilities in operational activities of blood collection, testing/processing, storage, Quality management and in the investigation of adverse transfusion reaction. Generally medical laboratory scientists may be employed in different capacities in the blood service and or hospital transfusion departments. The medical laboratory scientist may be employed as a laboratory director, Laboratory manager, and Quality manager/officer, safety officer/manager and ***Transfusion Practitioner*** as the case may be. The most crucial responsibility is that of putting quality into every aspect of the process from vein to vein. Medical Laboratory scientists are expected to understand that the process is like a long chain which is expected to have balanced strength at every link. The medical Laboratory scientist may have the following responsibility at the pre donation stage (Donor Selection) such as contribution to the blood donor questionnaire and heamoglobin estimation in the selection of the method, quality step and validation of same. The medical laboratory scientist is certified and licensed to practice. It is therefore expected that he or she should at all-times put quality

first in order to achieve best practice at all times. Medical laboratory scientist are **on call** at all times in the preclinical stages of the blood transfusion chain. By training Medical laboratory scientists are expected to apply the principles of Good Laboratory Practice (GLP), Good Preparatory Practice (GPP) and Good Manufacturing practice (GMP). The stake is high and the expectations are massive. Blood transfusion science/medicine aims at **Zero Error** all the time irrespective of the level of sophistication of the facility. It is very important that practionners keep in mind based the following basic principles of quality to be able to archive GLP, GPP and GMP. The quality system in the blood transfusion laboratory should pay special attention to the following in addition to the 12 key element of Quality management in the laboratory.Organization and staff, Training, Facilities and equipment, Reagents/test kits, Documentation, Samples management, Handling of test results, Quality control and Assessment. In this regard special attention should be paid to pre donation testing, post donation testing (BGS and TTIs testing) Transfusion microbiology, Pathogen Inactivation/Reduction, transportation and storage, and Quarantine and Release. Medical laboratory scientists in transfusion practice on call should make reference to the definitions at the beginning of this section of my presentation and handle all the processes and procedure as if they were the eventual beneficiary of their product.

Conclusion

In 2010 Dr. JB Tapko of WHO Afro wrote "It is now 35 years (today it is 47 years) since the first World Health Assembly resolution on blood safety and 11 years now (21 years) since the adoption of the strategy for blood safety in the Region. Significant success has been recorded in this area in the African Region. However, much remains to be done in all aspects of blood transfusion services.

Furthermore, there are considerable challenges to attainment of the health-related Millennium Development Goals (MDGs), and safe blood supply would contribute immensely in this regard. Africa did not attain much of the MDGs and today we are talking of Sustainable Development Goals (SDGs) It is expected that all hands must be on deck to enable Africa score high on the SDGs but time is not on our side as there are varying gaps in all the five thematic areas of blood safety practice in Africa. There is therefore need for the health sector to pool resources together and consolidate efforts to transform resolutions into practical actions so as to enhance the provision of this important aspect of health care in order to improve quality of the services delivered to the people of Africa. The development of haemovigilance and blood regulation are still very slow in the region efforts should be made in these areas as well close the gaps in the other thematic areas. "High cost low yield'

Health Economists have observed that state of the Arts testing is more economical in Africa than in Europe and America. This advocacy tool should be taken to the health authorities of different countries, ECOWAS, her sub regional equivalents and Africa Union AU for implementation in our region.

Medical laboratory scientist on call are expected to train very well in all the relevant areas of blood transfusion science to enable Us deliver quality service to the citizens of the region with the principles of GLP, GPP and GMP in our minds at all times otherwise quality will suffer in the service delivery which may impact negatively on somebody's life. Medical laboratory scientists on call must get it right first time and provide the right blood for the right patient at the right time.

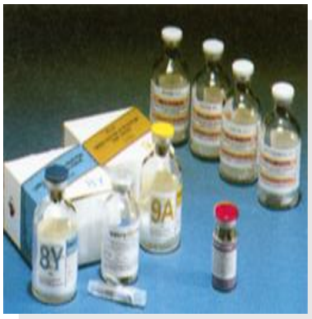
Let me end this presentation with the slogan: We are still looking at you (patients) when the clinics have closed.

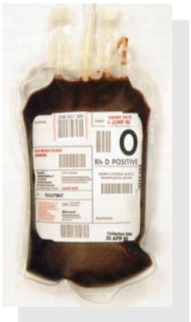
Thank you

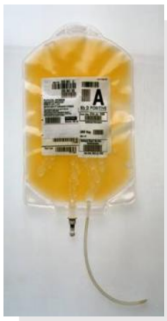
1.4 COMPONENTS OF BLOOD TRANSFUSION AND CRYOPRESERVATION OF BLOOD PRODUCTS AS KEY TOWARDS ATTAINING A HEALTHY BALANCE BETWEEN THE NEED AND SUPPLY: Mr. Abdulsalami Yakubu, Chief Medical Laboratory Scientist, Federal Teaching Hospital, Gombe, Nigeria, 08036652822, yakubu74@gmail.com

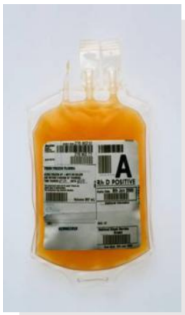
Highlights of the Presentation

1. Background
2. Concept of Component Transfusion
3. Cryopreservation of Blood
4. Modern concept of blood transfusion
5. Status of global blood need and supply
6. Closing the gap between Blood Demand and Supply









Historical Timeline

The concept of 'transfusion' has a longer history

- The first documented animal-to-animal (dog) blood transfusion was performed at Oxford in 1665 by Richard Lower,
- followed by the first animal-to-human blood transfusion in 1667 by Jean Denis.
- The first human-to-human blood transfusion was performed by James Blundell in 1818.
- 1828 – First successful transfusion
- 1901- Karl Landsteiner's discovery of ABO grouping laid foundation for scientific transfusion practices
- 1916 – First use of blood storage
- 1950's - disposable plastic systems for collection and aseptic separation of blood components came into use

Background

Blood transfusions are pillar of modern medicine that save millions of lives every year.

For instance:

- In high-income countries, transfusion is most commonly used for supportive care in cardiovascular surgery, transplant surgery, massive trauma, and therapy for solid and haematological malignancies.
- In low- and middle-income countries it is used more often to manage pregnancy-related complications and severe childhood anaemia (Nutritional anaemia).

  However, many patients still die or suffer unnecessarily because in low- and middle-income countries, many hospital patients do not have access to a timely and safe supply. (WHO, 2019)

- The **timely availability** of safe blood and blood products is key, but in many developing countries there is a **widespread shortfall** between **BLOOD NEEDS** and **BLOOD SUPPLIES.** Despite World Health Assembly resolution WHA63.12
- *Globally, 119 of 195 countries worldwide do not have enough to meet medical needs,* the deficit added up to 100 million units of blood (according to a modeling study published in *The Lancet Haematology* Journal, 2019).

THE DEMAND AND SUPPLY OF BLOOD AND BLOOD PRODUCTS IN AFRICA

- ❖ Most countries in sub-Saharan Africa have a huge gap between blood supply and demand.
- ❖ **In Africa, 38 countries collect fewer than WHO's goal of 10 donations per 1,000 people, and often test kits for blood-borne diseases are lacking.**
- ❖ Most other countries in Africa, as well as **South and Central Asia (including China and Russia)**, also faced major shortages.

In Africa, only South Africa met the need threshold. *(Lancet Haematol.* 2019)

Reason include: -

- ➢ Insufficient number of voluntary non-remunerated repeat regular blood donors to ensure an adequate supply of safe blood and blood components.

Modern Concept of Blood Transfusion

- Modern concept of blood transfusion emphasizes on the transfusion of component therapies instead of transfusion of whole blood.
- Globally, blood transfusion services aim to provide a lifesaving service by ensuring an adequate supply of safe blood:
- Whole blood can be used more effectively if it is processed into components, such as red cell concentrates, platelet concentrates, plasma and cryoprecipitate. In this way, it can meet the needs of more than one patient.

Rational Use of Blood
Rational

- Right product
- Right dose
- Right time
- Right reasons

Give only what is needed to Conserve the Scarce Resource

- ➢ **Better Patient Management**
  - concentrated dose of required component
  - avoid circulatory overload
  - minimize reactions

Red cells	O_2 carrying capacity (Anemia)
Platelets	Thrombocytopenia
FFP	Multiple clotting factor deficiency
CRYO	Hemophilia A

Different Storage Conditions

Component.	**Temp.**	**Shelf life**
Red cells	4-6^0 C	35 days
FFP/CPP	- 40 ^{0} C	1 year
Platelets	22-24^0 C on platelet agitator	5days
CRYO	- 40^0 C	1 Year

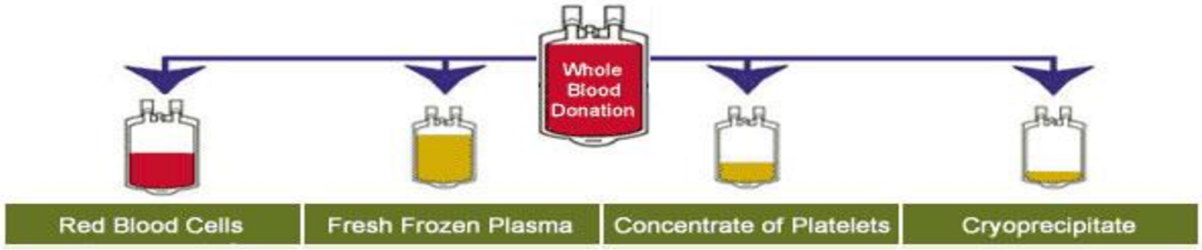
Indications for whole blood: Massive Blood Loss/Trauma/Exchange Transfusion

What is Blood Components

- ➢ Blood component preparation was developed in 1960 to separate blood products from one-unit whole blood by a specialized equipment called as refrigerated centrifuge.
- ➢ Blood components can be prepared from a unit of whole blood by differential centrifugation, filtration, and freezing using conventional blood bank methodology, into;
  - Packed red blood cells (PRBC)

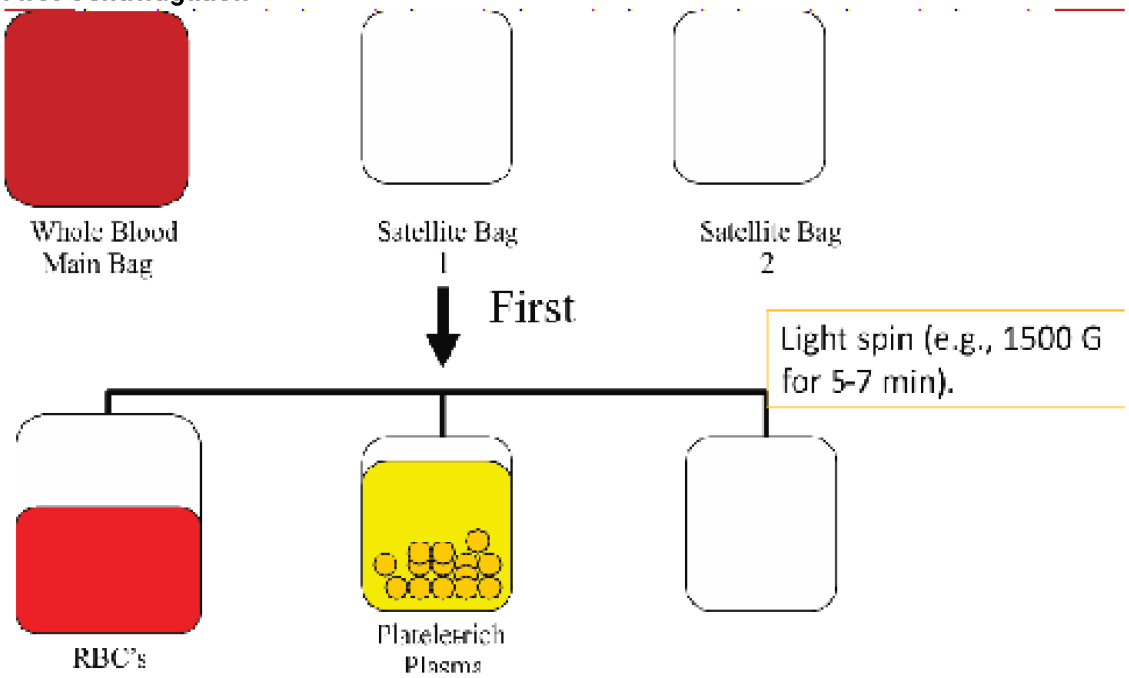
- Platelets (PRP) or random donor platelet (RDP)
- Fresh Frozen Plasma (FFP)
- Cryoprecipitate (CP)
- Cryo poor plasma (CPP)
- Plasma fractionation products

➢ Blood components may also be collected through Apheresis



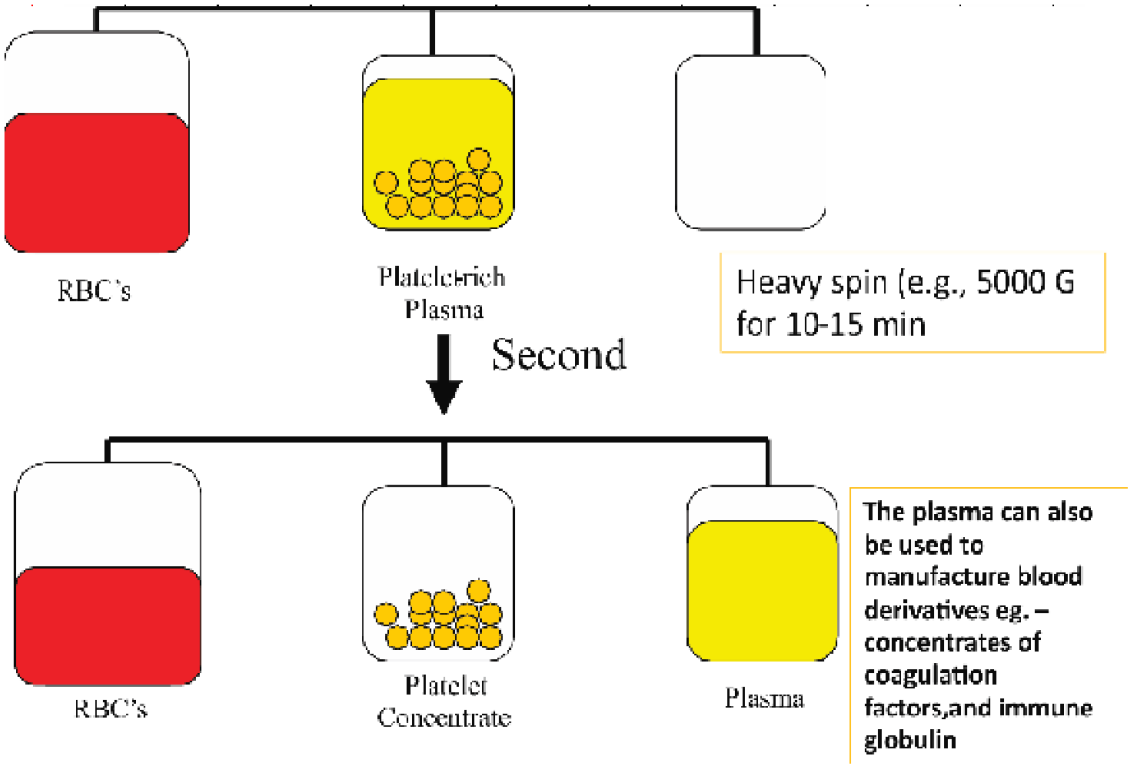
DIFFERENTIAL CENTRIFUGATION

First Centrifugation



- As different blood components have different relative density, sediment rate and size they can be separated when centrifugal force is applied.
- To utilize one blood unit appropriately and rationally, component therapy is to be adapted universally
- The components are prepared by centrifugation of one unit of whole blood. Single component required can also be collected by apheresis procedure in blood donors.

Second Centrifugation



- The heavy and light spin configuration varies with manufacturer and model. Here 'G' is relative centrifugal force calculated using revolutions per minute and rotor length.
- The Whole blood is collected as 350 ml or 450 ml in double/triple/quadruple or penta bags with CPDA-1 or additive solution. After blood collection, components should be separated within 5 - 8 hours.

COMPONENT COLLECTION BY APHERESIS PROCEDURE

Apheresis is a procedure where required single or more than one component is collected, and the rest of blood components are returned back to the donor.

The working principle of apheresis equipment is either by centrifugation (different specific gravity) or by filtration (different size).

The most commonly used equipments use the centrifugation principle and also give leucodepleted products.

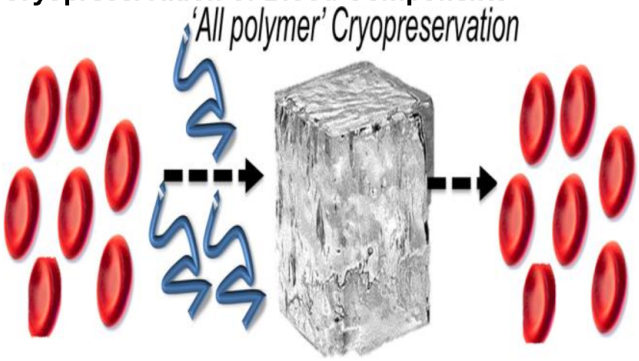
- Apheresis allow donor to donate one or more blood components at a time (platelets**, red cells, white cells, and plasma and stem cells**).
- Process is simple, safe and timely (15min to 1hr)
- Widely accepted as most safe method of blood collection from donors.
- **Apheresis can help meeting increasing demand for blood products in Nigeria**

Advantages of Using Blood Components

- The risk of circulatory overload is reduced: – eg **hemolytic anaemia** in malaria, partient undergone **cardiac surgical procedures**.
- Many partients can be treated effectively from a single unit of blood according to their needs.

- A unit of whole blood can be processed through a series of centrifugation into the required blood components.

Cryopreservation of Blood Components



Cryopreservation of Blood Products

- ❑ Cryopreservation is the process which refers to the "preservation in the frozen state"
  It is derived from the Greek word "KRYOS" meaning "FROST"
  The cryopreservation of blood is a method, which solves various problems in blood transfusion service.
- ❑ The storage of blood in the frozen state presented one of the alternative ways of storing blood components; this possibility was intensively explored in the 1950s and 1960s, when the shelf life of non - frozen red blood cells did not exceed 21 days at those times.

The main application is in

- ❑ Military and emergency healthcare and
- ❑ Blood crisis policy, in the case of disaster, terrorist attack, and war.
- ❑ Special areas, such as the storage of rare red blood cells and long-term storage of autologous blood.

The primary role of cryopreservation is the long-term preservation of cells and tissues while at the same time protecting them from the undesirable effects of frost.

The short shelf life of the RBCs, and Platelets resulted in the transfusion services not being able to meet demands of quickly evolving surgical disciplines, particularly

- ❑ cardiovascular surgery and
- ❑ radical surgical oncology.

Protection of cells from freezing is achieved by adding cryoprotective substances, in order to avoid an irreversible damage to cellular structures and membranes caused by them.

TYPE OF CRYOPPROTECTANTS USED FOR CRYOPRESERVATION OF BLOOD?

CPAs can be divided into two groups:

- small-molecular- weight penetrating CPAs (e.g., dimethyl sulphoxide [DMSO], glycerol, ethylene glycol, and propylene glycol) and
- high-molecular-weight non-penetrating agents (e.g. Sucrose, and hydroxyethyl starch).\

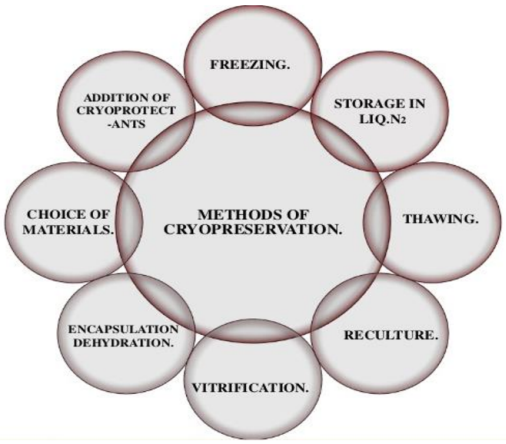
Intracellular (penetrative) cryoprotectants: as glycerol and dimethyl sulfoxide (DMSO), are used for the cryopreservation of blood cells.

- ✓ Glycerol is used for red blood cells cryopreservation and DMSO for platelets freezing.

These substances penetrate the cellular membrane and do not present any toxic danger to the cell when in low concentration.

METHOD OF CROPRESERVATION OF BLOOD

Cryopreservation can be subdivided into a number of interrelated elements all of which need to be **controlled** and each of which poses its own technical challenges



- Protocol for adding the CPA
- Choice of a freezing
- Mode of cooling
- Storage conditions
- Thawing and elution of CPA:

Cryopreservation of Blood Components: What are the Benefits

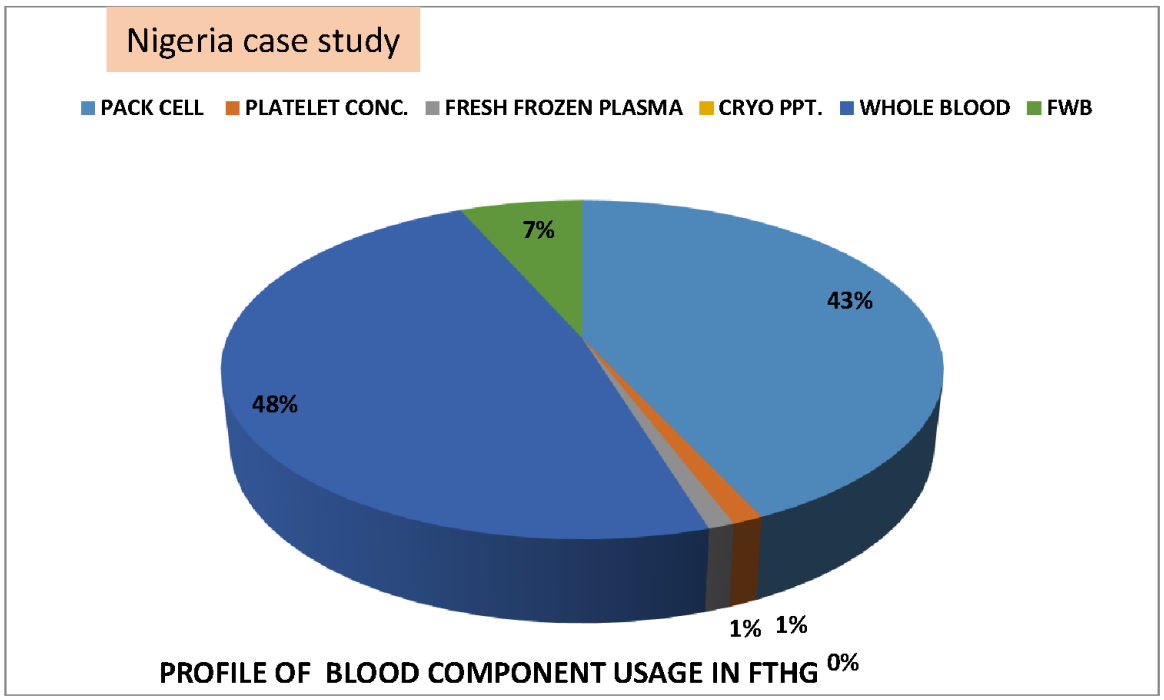
✓Frozen RBC has a **shelf- life of ten years** whereas liquid stored blood has a shelf-life of 5-**6 weeks with progressive degradation of cell parameters**

- ✓ Frozen bank allows building a long-term inventory of **rare and difficult blood group**
- ✓ **Exchange transfusion in babes** is done with O Rh-ve blood, less than 4-5 days old. This is often required on emergency basis. Frozen bank could help in getting such blood
- ✓ Cardiac surgery of Rh-ve patients is often delay because of non-availability of Rh-ve blood of required group in sufficient quantity
- ✓ Autologous blood program can be started especially in leukaemia patients undergoing chemotherapy

CAN COMPONENT THERAPY AND CRYOPRESERVATION OF BLOOD BRIDGE THE GAP BETWEEN DEMAND AND SUPPLY?

What are the missing gap, particularly in the sub-Saharan Africa?

- **Providing adequate, accessible** and **safe blood products** is a global priority, according to Health Organization (WHO, 2017).
- Reason why whole blood, red blood cells, platelets and frozen plasma are listed on the World Model List of Essential Medicines (EML).
- The listing of these blood products as EML implies a need to establish an **adapted regulatory oversight** of their production to assure their **quality, safety and efficacy** for use in transfusion (WHO, 2015)
- The developed world has access to a wide range of **licensed specialized plasma-derived medicinal products,**
- Whereas currently in most Sub Sahara Africa countries, particularly in Nigeria with most highly populated nation, whole **blood** still remains the main transfused product (Allain and Godrich, 2017)



The following reasons were all identified as contributing factors to the low blood availability in Africa:

- ✓ Insufficient supply of blood products,
- ✓ high prevalence of transfusion-transmitted infections due to a poor screening of donors,
- ✓ poor observance of privacy,
- ✓ high percentage of one-time-only blood donors and challenging epidemiology,
- ✓ limited financial resources from the government,
- ✓ lack of well-trained personnel,
- ✓ low general knowledge of blood transfusions,
- ✓ misconceptions on risks of blood collection, or spiritual and religious

Tagny et al, 2009 and Asamoah-Akuoko et al., 2017)

Future Gap-filling Intervention on between blood supply and blood in Africa countries, and Nigeria in particular:
Most developing countries like Nigeria, who currently have limited access to whole blood, to grow into the state where patients would have sufficient access to a range of specialized and safe blood products, requires enormous commitment and resources at government and blood organization levels.
Therefore, building local capacity in donor recruitment, blood collection and testing is crucial to address both non-emergency and emergency situations in Nigeria

Key messages

- No place for Whole Blood in clinical medicine
- **Sufficient access** to a range of specialized and safe blood products, **requires enormous commitment and resources at government and blood organization levels.**
- Discourage single unit / fresh blood
- Component preparation and use is the demand of time
- Promotion of judicious use of blood / components
- Promote autologous use of blood

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THANK YOU FOR LISTENING!

1.5 BRIDGING THE MENTORING GAP FOR THE FUTURE OF HAEMATOLOGY IN AFRICA:

Dr. Dakuku Peterside, Director –General NIMASA

I feel honoured to be called upon by this noble society to deliver this all important lecture on mentoring. I had basic training in Haematology and Blood Transfusion Science during my undergraduate days and I am conversant with mentoring as a necessary tool for capacity development. In this lecture, I will attempt to define mentoring, types of mentor, why mentoring and finally the application

What is mentoring?

Mentoring is a system of semi-structured guidance whereby one person shares their knowledge, skills and experience to assist others to progress in their own lives and careers. Following this definition, it is quite obvious that every sector of human endeavor requires a level of mentoring for maximum productivity. A system that lacks mentoring is a dead system and can never be productive. A student needs a mentor in form of an advisor or supervisor to know his bearing in his or her academic pursuit. A young lecturer who joins the lecturing career needs to be mentored to succeed. Even politicians need mentoring to do well otherwise they lose bearing. Mentoring is just a way of life.

The term 'mentoring' is interpreted in different ways, and is often used interchangeably with 'coaching'. Both can be about sharing particular areas of expertise and knowledge that the mentee needs; as well as about developing the individual whether or not they work in the same field. The two 'processes' can take place in the same session. For simplicity's sake, we use here the term 'mentoring' to cover all the processes involved in supporting the individual.

Mentors very often have their own mentors, and in turn their mentees might wish to 'put something back' and become mentors themselves - it's a chain for 'passing on' good practice so that the benefits can be widely spread.

Mentoring can be a short-term arrangement until the original reason for the partnership is fulfilled (or ceases), or it can last many years.
Mentoring is voluntary but extremely rewarding, and can benefit your own skills development and career progression

What Mentoring is not

Mentoring is more than 'giving advice', or passing on what your experience was in a particular area or situation. It's about motivating and empowering the other person to identify their own issues and goals, and helping them to find ways of resolving or reaching them - not by doing it for them, or expecting them to 'do it the way I did it', but by understanding and respecting different ways of working.

Mentoring is not counselling or therapy - though the mentor may help the mentee to access more specialized avenues of help if it becomes apparent that this would be the best way forward.

The basic thing about mentoring is that the mentee should be able to change/achieve his or her goals more quickly and effectively than working alone and would be able to build a network of expertise to draw on which can benefit both the mentee and others.

Types of Mentoring

Induction mentoring: Here a mentor should be assigned to you as a new member of staff, to help you orientate yourself to the department and its procedures, policies, personnel, sources of help and information, location of key equipment — and to help you 'survive' your first few weeks in a new post. They may act as a neutral and impartial confidante for any concerns or difficulties you may have in settling down, and help you to work out strategies for success.

Generally, they will not be someone in direct authority over you, and usually someone from outside your immediate circle is found, though preferably doing a similar or related role.

Peer Mentoring: As you progress, colleagues can 'peer-mentor' each other either in particular areas (such as teaching observation or project management) or for general support. Peer mentoring should still be about progress and development, and be equally supportive of each partner. Peer mentors should hold each other accountable for their action plans, and help each other to achieve their goals.

Developmental mentoring is about the synergy that two (or more) people can create between them to generate solutions, strategies and action plans, to build on success. Mentoring provides individuals with role models and may be a means of providing information about career and training opportunities (internal and external). Mentoring widens the support network, provides motivation and can improve confidence. With developmental mentoring an experienced mentor helps you to develop your strengths and potential, and identify your changing needs, values, aspirations, and what's most important to you. The mentor works with you to plan your professional development, and your next career. Research has found that the most effective people may have different mentors for different areas of their professional and personal lives. Your mentoring needs evolve in line with increased responsibility. You may have new duties, taken on new roles, been promoted.

What mentors can do:

- Act as an impartial sounding board
- Create valuable space and time for you to 'stand back' and review where you are now, where you want to get to, and how best to get there
- Contribute viewpoints, advice, and information from their own knowledge, experience and expertise
- Assist you to achieve changes and goals to enhance your professional and personal life

How to find a Mentor?

If you are a newly appointed member of staff, your Head of Department or departmental administrator should help arrange a mentor for you: this is called 'mentoring on appointment' or 'induction mentoring' and is described in Types of mentoring.

If you are looking for a different kind of mentoring as you progress in your, you can also find a mentor for yourself:

- by asking around for a suitable 'match'
- by identifying someone you may have come across whom you think would be a good person to approach
- by offering to peer-mentor or co-coach a colleague
- by looking for an mentor, external to the University
- by searching the web for more sources of information and contacting people or projects proactively. A good starting point is the Coaching and Mentoring Network

What makes a Good Mentor?

- Are you interested in helping others to succeed - even if they may surpass you in achievement?
- Are you reliable, honest, and trustworthy to keep things confidential?
- Are you capable of active listening - not interrupting, picking up important cues from what someone says, able to reflect back the relevant issues and check understanding, minimizing assumptions and prejudices?
- Are you empathetic - can you convey understanding of their experience without saying 'yes me too' and launching into anecdotes of your own?
- Are you able to question someone sensitively but empoweringly to help them explore their own issues?
- Can you pass on your knowledge and expertise clearly, encouragingly and helpfully?
- For those who are looking for mentors, check for the above qualities.

Why become a Mentor?

- To put something back into the system
- To help a less experienced colleague progress ("if only I'd known then what I know now")
- Increased job and personal satisfaction - the rewards of seeing someone you've helped progress and succeed are immeasurable
- Transferable skills development, to assist career progression
- The mentoring relationship enables you to:
  - develop strengths (yours and theirs)
  - check assumptions (yours and theirs)
  - clarify misunderstandings (yours and theirs)
  - work with people from different contexts and backgrounds
  - practise offering positive and constructive feedback
  - generate workable solutions together in a mutually respectful way

- motivate, advise and support whilst empowering someone to make their own decisions and take responsibility for their own actions and development
The great question is: how many people have you mentored?

Mentoring for the Advancement of Haematology
Haematology Scientists have an unprecedented opportunity to convert cutting-edge knowledge of biomedicine into clinically useful diagnostic and prognostic algorithms and new preventative measures and therapies. The field of practice spans from general haematology, coagulation, immunohaematology to blood transfusion.

It is interesting to note that hematology scientists have provided a paradigm for successful translation from bench to bedside through the development of allele-specific polymerase chain reaction (PCR) assays for the diagnosis of polycythemia vera, molecular analyses for the prenatal diagnosis of thalassemia, imantinib for treatment of chronic myelogenous leukemia, and new drugs to prevent and treat thrombosis. These discoveries, and countless others that fill the pages of journals, have come from the efforts of investigative hematology scientists trained in the past 30 to 40 years.

A very sad phenomenon is that the cost of biomedical research has continued to grow, and in the face of recent downturns in financial support and other obstacles to a successful career in academic medicine, some of our most promising new investigators have begun to turn away from careers in academic medicine.

Nowadays, successful translational research often involves teams of investigators that include basic scientists and clinicians as the case may be. However, in order to maintain and expand this effort in the coming decades, we must generate sufficient numbers of well-trained. Should we fail to do so, we risk returning to a former era in which clinical medicine all too often moved forward by reliance on serendipity rather than on the application of sound basic science principles to targeted diseases.

There is an entirely different set of challenges facing our junior colleagues who strive for careers as haematology scientists, hurdles that can best be tackled by effective mentoring. Academic life seems more “complicated” now than when we were junior, with little support for the academic advancement of essential members of scientific teams. Such barriers can appear at the divisional, departmental, school, and university levels, and we as caretakers of scientist training must make cogent arguments to overcome the promotions committees that inappropriately measure success only in the number of first- or senior-authored papers in high impact journals.

Now, more than ever, we are in need of outstanding mentors, but here is where the next problem arises: mentoring may have a low priority for busy faculty. One reason for the disengaging mentor is that securing funding now consumes more time for our mid-level and senior faculty, and all too often institutions do not reward mentoring. This must change, our academic leaders must make mentoring a calling, and while certain ingredients of the successful mentor must be intrinsic, such as generosity (of time and praise) and objectivity (the mentor must judge whether the trainee has “good hands” and the capacity for original thought), other skills, such as good listening and effective feedback techniques, can be taught, and should.

New faculty members are oriented to the importance placed on mentoring by senior faculty, and junior faculty are taught to expect guidance, and what is expected of them. New faculty members of the department/division are welcomed by groups of faculty who share common interests; often, the most effective career guidance comes from one’s peers. But each junior faculty member and each interest group also need to meet regularly with the chair and division head to approach the hurdles they face together. In addition to what is gained with the laboratory or clinical investigation mentor, the junior faculty member is encouraged to acquire additional skills in clinical research and common laboratory methods from others in the institution. This is intended to achieve what Joe Goldstein refers to as technical courage, allowing one to venture beyond the confines of prior experiences.

The successful mentoring program appreciates that one size does not fit all; specific trainee and junior faculty phenotypes are paired with the specific skills and credentials of their mentors. And successful mentors are rewarded academically for a job well done. Each of the challenges that face our junior faculty—achieving funding success, obtaining recognition of their critical contributions on a scientific team, gaining confidence in their role as a scientist, achieving technical courage and protection from

the demoralizing effects of doomsday chairpersons and editorialists—can be greatly aided by strong mentoring.

Conclusion: If mentoring is an option, it is the only option. Future generations of haematology scientists and their patients deserve nothing less

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1.6 BLOOD DONOR DEFERMENT: ETHICS OF SAFEGUARDING THE DONOR AND TRANSFUSION RECIPIENT: Commodore Abayomi Akinwale, Ph.D. (Rtd.). PhD FMLSCN MPA DSS

Preamble

- Adequate supply of blood is paramount in blood transfusion practice, the caveat is to ensure the collection and transfusion protocol do not endanger both the recipient and the donor.
- This is actualized by deriving donor deferral criteria strict adherence to screening of prospective donors for transfusion transmissible infections and other risk behaviors.
- Non-remunerated blood donation is recommended by WHO to further ensure blood safety.

Donor Selection Criteria

- Donor selection criteria were the result of a triad of historical principles:
    - The precautionary principle to ensure safety and quality,
    - The supply considerations, and
    - Expense considerations.
- This triad-based model has clear advantages: it is easy for the blood banks to work with, cheap, and very safe for the patients.
- The bottom-line- The health and safety of the donor as well as the recipient must be safeguarded

The Precautionary Principles to Ensure Safety and Quality

- The Precautionary principle, indicates that, in the interest of public health, risk management action should be taken even in the absence of certainty about risk, thus aiming for maximum safety
- Donors should be in good health at the time of donation and free of infections transmissible by blood.
- However, there is little consideration for preferences or sensitivities on the donor side:
    - Groups of donors are readily excluded if the average infectious risk for those groups is higher than the overall average in the population,
    - Exceptions are made only if the exclusion measure threatens the overall blood supply, which is considered in the second pillar of the model.

The Supply Considerations

- Malaria parasite as an exclusion criterion in Europe and US, while it is not in malaria endemic clime like Nigeria
- Food and Drug Administration (FDA) of USA Screening Guidelines
    - Most travelers to an area with malaria are deferred from donating blood for 1 year after their return.
    - Former residents of areas where malaria is present will be deferred for 3 years.
    - People diagnosed with malaria cannot donate blood for 3 years after treatment, during which time they must have remained free of symptoms of malaria.
- Taking into account the impact on supply to define the level of exclusion is a form of irrationality, as it implies that a very large group is less likely to be excluded than smaller groups.

Expense Consideration

- People not only expect to receive adequate quantities of safe blood but also expect to receive it at an acceptable price.
- This implies that donor selection criteria should be cheap and easy to apply during blood drives.

Donor Deferral

- Donors who do not to meet the selection criteria are deferred on a temporary or permanent basis.
    - Temporary deferral connotes that the prospective donor is deferred based on removable, time bound factor such as low hemoglobin, hematocrit and more,
    - Permanent deferral implies that the prospective donor has non-removable, long lasting factor such as possibility for any of the transfusion-transmissible infections (TTIs)
- The causes of deferral can be classified into three main categories:
    - Personal factors, e.g. age, weight
    - Medical examination and
    - Medical history.

Handling Deferred Donors

- All deferred donors should be treated with respect and care.
- In a confidential manner.
- Should be given a clear explanation of the reason for deferral and an opportunity to ask questions.
- They should be informed whether the deferral is to safeguard their own health and/or that of the recipient.
- It is the responsibility of the BTS to ensure that donors who are deferred due to medical conditions are referred for further investigations and management, as appropriate.

Donor Deferral- Good Intentions with Unwanted Adverse Effects

- *Donor:*
  - ***Feelings of Rejection****.* In general donors feel healthy, have the intention to help a patient, take their time to come to a donor centre, and may not be allowed to donate their blood.
    - A common reason is that the haemoglobin level is just belowthe lower limit. Most likely this has an impact since it is known that deferrals due to low hemoglobin have a strong effect on return rates of both first-time and repeat donors

  - ***Confrontation with "Old" Diseases:*** Donors with a previous history of disorders such as cardiovascular or malignant diseases may have undergone treatment, are asymptomatic, but shall in most cases be deferred.
    - These donors generally feel cured, may nearly have forgotten their disease, and are now confronted with a medical deferral.
    - Despite the physician or nurse tries to ease the disappointed donor, a number of donors relive their disease.
  - ***Feelings of Discrimination****:* Blood donors belonging to minority groups are prone to feel discriminated upon, when deferred.
    - Groups where the incidence of blood-borne infectious disease is higher than that in the background population are deferred to reduce the number of infected blood components from donors who, at the time of donation, were in the window period.
    - Examples of such groups are men who have sex with men (MSM) and couples where one of them come from countries that cause deferral due to risk of contagious and blood-borne infections.

Conclusion

Non-remunerated blood donation as recommended by WHO is considered a gift and the blood centre has a right to accept or defer it if unacceptable.

Donor deferral might appear as discrimination and a violation of a human right, but the patient's right to safer blood is more important than the donor's right to not to discriminated against, as blood centres are made to help patients and not donors.

THANK YOU!

CHAPTER 2:

ABSTRACT FOR ORAL PRESENTATION

HBTSSN-2020-001

The pattern of Haemostatic changes in Patients with Lymphoid Malignancies on chemotherapy in Benin City, Edo State.

Emmanuel. C. Onuoha *[1], Evarista Osime [2], C. E. Omoti [3], Benjamin. O. Eledo [4].

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3. *Haematology Department, College of Medicine, University of Benin, Benin City, Edo State, Nigeria*
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Abstract

Background: Thrombosis may occur as a result of some lymphoid malignancies and chemotherapeutic agents used. No routine laboratory investigation of single coagulation factor assay is available for lymphoid malignant patients and much research has not been done to evaluate the value of these parameters in novel lymphoid malignant patients and those on chemotherapy to the best of my knowledge. Therefore, the study aims to evaluate factor V, VII, VIII levels and platelet count in such patients to ascertain the impact of chemotherapy on them.

Methods: This study was a prospective study carried out in a tertiary hospital in Benin City, Edo State for period of six months from March to August, 2017. A total of sixty (60) patients, comprising of twenty lymphoid malignant patients on chemotherapy, twenty novel lymphoid malignant patients and twenty controls participated in the study. Quantitative measurements of factor V, VII, VIII were done by the one-stage method and estimation of platelet count was done by Automated Haematology Analyzer.

Results: The comparison of percentage levels of coagulation parameters and platelet count between novel lymphoid malignant patients: factor V, VII, VIII ($p<0.001$), platelet count ($p<0.05$), on chemotherapy: factor V ($p<0.05$), factor VII, VIII ($p<0.001$) decreased significantly compared with the apparently healthy controls while platelet count increased significantly. However, platelet count ($p>0.05$) did not change significantly compared with the control for lymphoid malignant patients on chemotherapy. The comparison of coagulation parameters between lymphoid malignant patients on chemotherapy: factor VII, VIII ($p<0.05$) and novel lymphoid malignant patients ($p<0.05$) respectively increased significantly while factor V, platelet count ($p>0.05$) and platelet count ($p>0.05$) respectively, were not significant.

Conclusion: It was discovered that lymphoid malignancy is associated with haemostastic disorder and chemotherapy reduces platelet count in lymphoid malignant patients. For global health security in sub-Saharan Africa of the lymphoid malignant patients, there should be a routine screening for the entire specific single coagulation factors assay and platelet count before the commencement of the chemotherapy. Critical target of haemostastic parameters in lymphoid malignancy can provide a unique approach to lymphoid malignant management and treatment.

Keywords: *Haemostatic changes, Lymphoid Malignancies, chemotherapy, Benin City, Edo State.*

HBTSSN-2020-002

Activated Protein C resistance uncovered as a contributor to Thrombotic Disorders in Southwestern Nigeria.

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Abstract

Background: Activated protein C resistance (APCr) is a hypercoagulable condition in which there is resistance of the activated Factor V to cleavage by activated protein C resulting in poor anticoagulant response with an increased risk for venous thromboembolism (VTE). Thrombotic disorders are serious disorders with high morbidity and mortality rates known to be consequences of many genetic and acquired risk factors such as APCr which is found in about 5% European Caucasians and 1.2% Asians and North Africans. The manifestation of APCr in thrombotic disorder often require the presence of risk factors such as malignancy, pregnancy, trauma, surgery, the use of oral contraceptives and the presence of an antiphospholipid antibody.

Methods: Nine hundred (900) subjects comprising of six hundred pregnant subjects (600) and three hundred (300), apparently healthy, non-pregnant women who served as controls were recruited from tertiary hospitals across five states of Southwestern Nigeria (Ekiti, Oyo, Osun, Lagos and Ogun). Questionnaire was administered to obtain the clinical history of the participants and parameters assessed include; packed cell volume (PCV); Platelet count (Mindray analyser); haemoglobin electrophoresis by alkaline electrophoresis; Prothrombin time (PT) and activated partial thromboplastin time (APTT) tests (Diagen Ltd); D-dimer (Tina Quant Gen II, Roche Cobas CII analyser) and Activated Protein C resistance assays (Chromogenix Coatest, Diapharma).

Results: The results showed a significantly increased D-dimer (2.27±1.00) in the subjects while other coagulation markers were significantly reduced ($p<0.05$). The prevalence of APC-V ratio <2.0 among the studied population is 1.0 % (nine subjects) with 1.2 % among subjects and 0.7% among controls .These nine subjects with APCr were observed to possess normal PCV; reduced PT (<11secs) and APTT (<25secs); increased D-dimer (>0.50ugFEU/ml); reduced APC-V ratio <2.0. They are either HbAA or Hb AS and six of them exhibit recurrent thrombosis associated symptoms. Also, four of them have history of Caucasian background. In addition, it was observed that some subjects without APCr possess reduced and increased levels of PT/APTT and increased D- dimer simultaneously.

Conclusion: This study concludes that APC resistance exists in a minute prevalence (1.0%) of pregnant women in this region with the manifestation observed in the assays and symptoms of the pregnant women especially recurrent lower limb pains. Furthermore, this study has revealed that the APCr mutation is not related or dependent on the haemoglobin electrophoretic pattern of an individual; it also revealed likelihood of detecting some other coagulation disorders that could result in thrombotic complications contributing to maternal mortality.

***Keywords**: Activated Protein C resistance, Thrombotic disorders, Coagulation disorders*

HBTSSN-2020-003

Alteration in Eosinophil's Granular Content in Stained Film as an Index for Estimating the Shelf-lives of Modified Leishman Stains: Implications on Disease Diagnosis

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Abstract

Background: Modified Leishman stain is a newly discovered stain which is composed of Leishman powder, absolute methanol and phenol. It is not unusual sometimes in diagnostic haematology laboratories to have improperly stained thin blood films, without any clear-cut reason, leading to misdiagnosis of disease. Notably due to lack of published data on the shelf-lives of modified Leishman stain, we hypothesize that misidentification of cells can result from the use of time expired stain.

Method: Four modified Leishman staining solutions were prepared using phenol crystals and liquefied phenols as the sole modifying component ingredient. Thin blood smears were made in multiples of four from each of the patients requiring peripheral blood film review especially those with high eosinophil counts. The smears were stained with the prepared dyes for a total of 75.0 seconds or 4.0 minutes and examined for cellular elements of the blood by the researchers. **Result:** At expiration, while other cellular elements of the blood stained normally, eosinophil granular content altered from orange-red to orange/reddish-brown and shades of brown and that was used to estimate modified Leishman stains' shelf-lives. Estimated shelf-lives of the modified Leishman stain were 25 days (21-29 days), ≤ 28 days, up to 52 days and ≤ 18 days when the first, second, third and fourth methods of preparation respectively were used. Modified stain prepared by initial dissolution of phenol in absolute methanol before using resultant mixture to dissolve Leishman powder had the longest shelf-life- up to 52 days. It was ≤28 days when liquid phenol was used in similar pattern to conventional technique. When phenol crystals were used, the average shelf-lives were 25 days (21-29 days) and ≤ 18 days respectively.

Conclusion: Conclusively, modified Leishman stain should be prepared and used with the consciousness of the expiry dates. This finding can potentially prevent misclassification of eosinophils during differential leukocyte counts, thus enhancing disease diagnosis.

Keywords: *Eosinophil's Granular Content, Stained Blood Film, Shelf life, Modified Leishman Stains, Disease Diagnosis.*

HBTSSN-2020-004

Suitability of Lower K2- EDTA Sample Volumes for Absolute CD4 Count Enumeration by Flow Cytometric Technique

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Background: Incorrect blood sample volume-anticoagulant ratio has been the cause of both haematological and immunological errors especially when K3-EDTA anticoagulated blood are used. Lower whole blood sample volumes collected into 4.0 millilitres spray-dried K2-EDTA has been shown to overcome incorrect haematology results when analyzed on automated haematology analyzers but there is no experimental evidence for the same in the CD4 count enumeration by flow cytometric technique.

Method: Nine milliliters (9.0 ml) of whole blood was collected from each of fifteen retroviral and ten normal volunteers and aliquoted into five different 4.0 ml plastic spray-dried K2-EDTA blood collection tubes containing 4.0, 2.0, 1.5, 1.0 and 0.5 ml respectively. Each well-mixed sample was analyzed on Partec Cyflow counter within 4 hours of collection for absolute CD4+T lymphocyte count.

Results: Both the reference sample volume 4.0 ml and experimental lower sample volumes (2.0, 1.5, 1.0 and 0.5 mls) of retroviral volunteers in 4.0 ml plastic spray-dried K_2EDTA blood collection tubes gave comparable CD4 count results with percentage mean difference of 1.82%, -1.48%, 2.25% and 0% for 2.0 ml, 1.5 ml 1.0 ml and 0.5 ml respectively. Irrespective of sample volumes, the normal volunteers had higher CD4 count results. There was no statistically and clinically significant difference in the CD4 counts and the percentage mean difference were 0.4%, 0.17%, 1.00% and 0.23% for 2.0 ml, 1.5 ml, 1.0 ml and 0.5 ml respectively. The correlation (slope) and modest logistic regression coefficient (R^2) of experimental lower sample volumes of both retroviral and normal volunteers were between 0.9500 and 1.0000 showing excellent agreement in the CD4 counts of both reference and experimental sample volumes ($p<0.01$).

Conclusion: Quality CD4 count results can be obtained with a minimum sample volume of 0.5 ml in 4.0 ml spray-dried K_2EDTA Vacuitaner blood collection tubes both in HIV-infected and healthy individuals with intact immune function.

Keywords: *K2- EDTA, Sample Volumes, Absolute CD4 Count, Flow Cytometric Technique.*

HBTSSN-2020-005

Interactions of Glucose-6-Phosphate Dehydrogenase Deficiency, Haemoglobin Variants and Haematological Indices in Sub-Clinical Malaria Infected Pregnant Women

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Abstract

Background: The burden of malaria disease is believed to share the same geographical distribution that correlates with G6PD deficiency and sickle cell haemoglobin (HbSS) due to protective advantage against malaria parasites. This study investigated the interactions of these genetic factors and haematological indices in sub-clinical malaria infected pregnant women.

Method: G6PD activity was measured quantitatively with 3000 BSA spectrophotometer using the Randox G6PD kits. Full blood count was determined using haematological auto-analyser, Mindray BC-6800. Malaria parasite density was determined microscopically using thick and thin Giemsa stained blood smears. Determination of haemoglobin variant was done using cellulose acetate membrane electrophoresis with Tris-EDTA-borate buffer (pH 8.9). A total of eight hundred and twenty-eight (828) individuals participated in the study.

Result: Of the eight hundred and twenty-eight participants, five hundred and seven 507 (61.2%) were infected with malaria parasite and three hundred and twenty-one (321) (38.8%) served as controls (uninfected subjects). HbAA electrophoretic pattern predominated among the malaria parasitized, 379 (74.8%), then HbAS 126 (24.9%) and HbSS 2 (0.4%). Also, five hundred and seventeen 517 (62.4%) out of eight hundred and twenty-eight (828) participants were G6PD deficient. The mean age of the study participants was 29.5±5.31 years. The mean parasite density of 5147.78±356.79/µl in the primigravida group was significantly higher than 4131.02±294.11/µl observed in the multigravida group ($p = 0.02$). The mean platelet count for age 21-25 years was remarkably reduced at 193.05±4.81 $x10^9$/L when compared with the age range < 21-36 years and above ($p< 0.05$). The mean value of G6PD levels for HbSS was significantly elevated at 12.20±0.30 compared with HbAS, 6.28±0.16 and HbAA, 6.60±0.07. There was also a significant decrease in the mean PCV among the HbSS subjects 25.20±1.80% compared with HbAS, 33.39±0.24% and HbAA, 33.98±0.25% ($p = 0.043$). There was a significant and negative correlation between Parasite density and G6PD deficiency ($r = -0.1442$, $p = 0.001$), between PCV and G6PD deficiency ($r = -0.1551$, $p = 0.0005$), between lymphocyte and G6PD deficiency ($r = -0.1195$, $p = 0.0071$), between Lymphocyte and TWBC ($r = -0.1511$, $p = 0.0006$), between Monocytes and lymphocytes ($r = -0.1116$, $p = 0.0119$), between basophil and Monocyte ($r = -0.1100$, $p = 0.0132$), between MCHC and TWBC ($r = -0.0934$, $p = 0.0358$), between MCV and G6PD deficiency ($r = -0.0985$, $p = 0.0265$), between MCV and Eosinophil ($r = -0.1171$, $p = 0.0083$) and between platelet and G6PD deficiency ($r = -0.1128$, $p = 0.0110$) respectively. There was also a significant and positive correlation between Lymphocyte and PCV ($r = 0.1486$, $p = 0.0008$), between MCV and parasite density ($r = 0.1475$, $p = 0.0009$), between MCV and lymphocyte ($r = 0.1067$, $p = 0.0163$) and between basophil and MCH ($r = 0.6668$, $p = 0.0001$) respectively.

Conclusion: It is therefore concluded that co-inheritance of G6PD and HbS has no advantage over single inheritance of HbS variant. The high prevalence of G6PD in *P. falciparum* infected pregnant women and the correlation of G6PD with some haematological may be a justification to include G6PD testing in the antenatal care plan for pregnant women.

Keywords: *Glucose-6-Phosphate Dehydrogenase Deficiency, Haemoglobin Variants, Haematological Indices, Sub-Clinical Malaria, Pregnant Women.*

Effect of oral administration of diclofenac sodium on coagulation factors and some haematological parameters in Wistar rats.

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Abstract

Background: Diclofenac sodium is a nonsteroidal anti-inflammatory drug often obtainable as a prescription or over the counter drug. It is very effective in the control of inflammation and pain due to arthritis or pains arising following many disease conditions, because of its antipyretic, anti-inflammatory and analgesic potentials. Despite the beneficial effects of diclofenac sodium, it has been implicated in some adverse effects. In this study, we examined the effect of acute and chronic administration of diclofenac sodium on some haematological (PCV, WBC differentials) and coagulation (prothrombin time, activated partial prothrombin time and platelets count) parameters of albino Wistar rats using the standard methods.

Method: Twenty-four Albino Wistar rats were divided into three groups of 8 rats and grouped as control, acute study and chronic study. The rats were administered 0.2mg of diclofenac sodium for 24 hours for acute and 3 weeks for chronic studies respectively. The rats were sacrificed and blood collected for PCV, WBC differentials, prothrombin time, activated partial prothrombin time and platelets count.

Result: Results show that acute administration of diclofenac sodium at 0.2mg has no effect on haematological and coagulation parameters, but chronic administration could instigate significant reduction in PCV, platelets count, neutrophils and monocytes ($p<0.001$), while there is a significant increase in PT, INR, lymphocytes ($p<0.001$).

Conclusion: Considering these biological alterations, it is advisable that this drug should be made a strictly prescription drug in order to prevent indiscriminate use of this medication and to prevent attendant anaemia and coagulopathy that may follow chronic use.

Keywords: *Diclofenac sodium, coagulation factors, some haematological parameters, Wistar rats.*

HBTSSN-2020-007

Isolated serum hepatitis B core antibody seropositivity: A diagnostic risk factor for occult hepatitis B infection

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Abstract
Background: Anti-HBc screening and nucleic acid testing for hepatitis B viral DNA (HBV DNA) detection in blood donors are not routinely performed in clinical settings in Nigeria. This raises serious concerns for safety of blood at a time that global health standards advocate for transfusion safety. The aim of this research is to investigate if presence of anti-HBc in blood donors is actually associated with occult hepatitis B infection through basic and advanced procedures.

Method: Prospective blood donors who were seronegative for HBsAg but sero-positive for anti-HBc (with or without other markers) among the four hundred and seventy enrolled in a cross-sectional study were selected for this study. Samples were further screened for hepatitis B core immunoglobulin M by enzyme-linked immunosorbent assay. Nucleic acid testing was performed for confirmation of occult hepatitis B infection.

Result: Anti-HBc was detected in 20 (32.8%) of the sixty-one HBsAg antigen-negative blood donors which constituted 13.0% of the total number of enrolled blood donors. Anti-HBc total-positive differentiation showed eighteen (90.0%) anti-HBc (IgG) and two (10%) anti-HBc (IgM) were detected. Nucleic acid testing showed 5.0% prevalence of occult hepatitis B infection among the anti-HBc-positive blood donors with estimated HBV DNA viral load of 58 IU/ml. Demonstration of 5.0% occult hepatitis B prevalence showed the possibility of post-transfusion hepatitis B infection in transfusion recipients with consequent possible liver damage should hepatitis B surface antigen alone be the continued practice in clinical settings.

Conclusion: The inclusion of antibody to hepatitis B core antigen screening in addition to hepatitis B surface antigen marker may be an essential step to ensuring optimal blood safety and prevent post-transfusion hepatitis.

Keywords: *Serum hepatitis B core antibody, diagnostic risk factor, occult hepatitis B infection.*

HBTSSN-2020-008

Assessment of Some Haemopoietic Growth Factors and Some Haematological Parameters in Chronic Kidney Disease Subjects with or Without Blood Transfusion in Port-Harcourt

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Abstract

Background: Chronic kidney disease (CKD) is a progressive loss in kidney function or structure over a period of three (3) months. The assessment of renal erythropoietin (EPO) and thrombopoietin (TPO) in CKD which is the major cause of anaemia seems to be neglected hence, this study became necessary. Anaemia is a major complication in CKD. The aim of this study was to assess some haemopoietic growth factors and some haematological parameters in chronic kidney disease subjects with or without blood transfusion in Port Harcourt.

Method: A total of one hundred and fifty-two (152) subjects (94 males and 58 females) participated in this study. One hundred and twenty-two (122) subjects (76 males and 46 females) were those confirmed to have chronic disease of which thirty-eight (38) subjects were naive to blood transfusion and eighty-four (84) subjects were transfused with blood. Thirty (30) subjects were apparently healthy individuals which serve as the controls. Ten milliliters (10ml) of venous blood sample was collected by venipuncture from the subjects: Five milliliters (5ml) was transferred into EDTA tubes for the analysis of haematological parameters which was analyzed within four (4) hours after sample collection. Five milliliters (5ml) was transferred into plain plastic bottle for the analysis of erythropoietin and thrombopoietin. Assays was carried out on the serum sample thawed only once. Erythropoietin and TPO were determined by sandwich ELISA method while the full blood count was determined using haematology autoanalyser, Mindray BC-5800. The results obtained were statistically analyzed using Graph pad prism version 5.0 and one-way analysis of variance and statistical significance set at $p>0.05$. The results were presented as mean ± standard deviation.

Results: The result showed a significant decrease in EPO level in the transfused and non-transfused subjects (4.95±2.95, 6.32±2.66) respectively compared to control (10.51±3.05). A significant increase in TPO in the transfused (5.85±3.58) compared to non-transfused and control subjects (1.13±0.52, 1.15±0.36) respectively was observed. There was also a significant decrease in the haematological parameters in the transfused and non-transfused compared to control subjects. The result also showed a negative non-significant correlation between the EPO and haematological parameters of the transfused and non-transfused subjects; and a positive significant correlation between TPO and platelet counts of both the transfused and non-transfused. It is therefore concluded that a significant decrease in the levels of EPO and the haematological parameters in the transfused and non-transfused showed that transfusion does not improve anaemia in CKD subjects.

Conclusion: The positive significant correlation between TPO and platelet counts of both the transfused and non-transfused may be a justification to include thrombopoietin assessment in the care plan of CKD subjects and to discourage the unnecessary administration of recombinant TPO used in the management of chronic kidney disease in other to avert severe occurrence of thrombocytopenia.

Keywords: *Haemopoietic Growth Factors, Haematological Parameters, Chronic Kidney Disease, Blood Transfusion, Port-Harcourt.*

HBTSSN-2020-009

Lower Sample Volumes Collected into Spray-Dried K_2EDTA Vacuitaner Bottles Are Suitable for Automated Complete Blood Count. Analysis Including Differential Leukocyte Count

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Abstract

Background: Collection of lower sample volumes into dipotassium ethylene diamine tetra acetic acid (K2-EDTA) containers, according to the manufacturers' data and current Clinical and Laboratory Standards Institute, results in erroneous haematology results.

Method: To prove this hypothesis, we collected acceptable limit of lower sample volumes for haematology analyses into the 4.0 ml standard spray-dried K2-EDTA. Nine milliliters (9.0 ml) of blood from 15 retroviral volunteers was collected and each donation was aliquoted into the following volumes 4.0, 2.0, 1.5, 1.0, 0.5 ml. These samples were analyzed within 4 hours of collection on Sysmex KX-21N haematology analyzer for complete blood count (CBC) including leukocytes differentials.

Results: T-test showed there was no significant difference between results of lower samples volumes and the standard volume and regression analysis showed excellent correlation for all parameters. Lower sample collection volumes compared to the standard volume showed negative bias for platelet count but the difference was considered insignificant with percentage differences of 4.6%, 3.0%, 2.9%, and 1.7% for 1.0, 1.5, 0.5, and 2.0 ml collection volumes respectively. Flag messages were noticed in about 67.0% of the patients irrespective of collection volumes.

Conclusion: Acceptable CBC values for spray-dried K_2EDTA collection tubes containing lower sample volumes can be obtained with as little as 1.0 ml in Nigerian subjects.

Keywords: *Sample Volumes, K2-EDTA, Complete Blood Count*

HBTSSN-2020-010

Pattern of Blood Donation and Blood Usage in Federal Medical Center Yola, Adamawa State, Nigeria

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Abstract:

Background/Objective: Pattern of blood donation and usage plays important role in blood availability for emergency lifesaving events. The aim of this study was to analyze the pattern of blood donation and usage in order to provide information for good blood donation strategies in Yola Adamawa State Nigeria.

Materials/methods: Three milliliters (3ml) of blood was collected by venipuncture from potential donors into EDTA vacutainer for PCV estimation and ABO cell grouping. When the PCV was ≥ 40%, the blood was further screened for HCV, HBsAg, HIV and VDRL using appropriate kits. Thereafter, 450ml of Blood was collected from each donor into blood bag containing 63ml of CPDA.

Results: One thousand four hundred and seventeen (1417) pints of blood was donated within the study period of 5 months and 1346 (95%) of donated blood was transfused as whole blood while 71 (5%) was used as packed red cell. Two hundred and fifty-two (252) 17.8% of blood donors were commercial/paid donors while (24) 1.7% were voluntary donors. Family replacement donors and autologous blood donors made up (1128) 79.6% and (13) 0.9% of blood donors respectively and an average of 11 pints of blood were donated daily while an average of 2 pints of blood were issued out but not used. Four hundred and twenty (421) 29.7%, (79) 5.6% and (132) 9.3% of blood donors were Artisan, Civil Servants and Traders respectively. Mean age and PCV of donors were 31±09years and 43±03% respectively at $p<0.05$ and (1401) 98.8% of blood donors were males while (16) 1.2% were females.

Conclusion: Artisan and family replacement donors made up the largest percentage (29.7% and 79.6% respectively) of blood donors**.** Dominant blood group among donors was O Rhesus D positive and 16% of blood donation requests were gratuitous in Federal Medical Center Yola.

Keywords*: Blood Donation, Blood Usage, Federal Medical Center, Yola, Nigeria.*

HBTSSN-2020-011

Evaluation of some Haematological Parameters in Asthmatic Patients attending Imo State University Teaching Hospital, Orlu, Imo State, Nigeria.

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Key Words: Haematological Parameters, Asthma, Orlu

Background: Asthma is a condition in which a person's airways become inflamed, narrow, swell and produce extra mucus which makes breathing difficult. It is a public health problem in all countries regardless of the level of development. In asthmatic condition, levels of some haematological parameters are altered.

Aim and Objectives: The aim of this study was to determine the levels of some haematological parameters in asthmatic patients attending Imo State University Teaching Hospital, Orlu. The objectives include; to determine the levels of haemoglobin (Hb), white blood cell (WBC), platelets and differential WBC counts among asthmatic patients and non-asthmatic subjects.

Methodology: A cross-sectional study was carried out at Imo State University Teaching Hospital, Orlu from August – October, 2019. Twenty –five (25) asthmatic patients constituted the study population, while an equivalent number of apparently healthy age-matched individuals served as the controls. Questionnaires were administered to obtain their social and demographic data. Two milliters (2mls) of blood was collected from each individual and dispensed into potassium individual and dispensed into potassium EDTA containers for investigation of hematological parameters using haematology autoanalyzer. Data generated were analyzed using SPSS version 21.

Results: The mean values of WBC ($x10^9$/l) (11.41 ± 1.77) neutrophils (%) (65.64 ± 7.97) and Eosinophils (%) (5.76 ± 2. 35) in the test groups were significantly raised when compared to the controls (4.88 ± 1. 08), (57.28 ± 8. 74) and (0.20 ± 0.50) respectively ($p < 0.001$). That of Hb (g/dl) (10.60 ± 0.66) and lymphocytes (%) (27. 32 ± 6.39) were significantly decreased in the study group compared to the control (11.85 ± 1.00) and (41.72 ± 7.72) ($P < 0.001$), while the platelets in the test group (241.96 ± 55.69) were non- significantly increased when compared to the control (215.49 ± 43.13) ($p = 0.066$). The level of monocytes in the study group (0.12 ± 0.44) showed no significant difference when compared to the control (0.016 ± 0.37) ($p = 0.731$).

Conclusion: The findings have shown that some haematological parameters are altered in asthmatic condition. Therefore, these parameters should be included in the diagnosis of asthma for proper management of asthmatic patients.

HBTSSN-2020-012

POSTER PRESENTATION

Prevalence of some Transfusion Transmissible Viral Infections among Blood Donors in Federal Medical Centre, Owerri, Nigeria

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Background: Blood transfusion is an integral part of medical care and treatment. Transfusion-transmissible viral infections, such as hepatitis B(HBV) hepatitis C(HCV) and human immunodeficiency virus (HIV), remain a major public health problem in developing countries. The prevalence of these viral infections among blood donors may reflect the burden of these diseases among the general population.

Aim and Objectives: The aim of this study was to determine the prevalence of some transfusion-transmissible viral infections among blood donors at Federal Medical Centre, Owerri, Imo State. The objectives include; to determining the age and gender-related prevalence of transfusion transmissible viral infections among blood donors.

Methodology: A Prospective cross-sectional study was carried out during the period of August-October, 2019. The study group consisted of blood donors who donated blood to the blood transfusion unit of Federal Medical Centre, Owerri. A total of 150 blood donors were recruited for the study using a questionnaire. Blood samples were collected and screened for the presence of HBsAg, HCV, Syphilis (VDRL) and HIV I & II. Data generated was presented in percentages and was considered to be significant at $p<0.05$.

Results: Out of the 150, subjects screened for HBsAg, 31 (20.67%) were positive, while 119 (79.33%) were negative, 7(4.6%) were positive for syphilis, while 143 (95.33%) were negative. For HIV I & II, 40(26.67%) were, positive, while 110 (73.33%) were negative.

Conclusion: The study has shown that the prevalence of TTIs is substantial and has increased overtime. Youths between the ages of 18-28 years had a high prevalence of TTI's infection, while males had a higher prevalence than females. Therefore, there is need for proper screening of blood before transfusion to prevent adverse outcome in the recipient.

HBTSSN-2020-013

ORAL PRESENTATION

Evaluation of Some Haematological Parameters and Liver Enzymes among Hepatitis B Virus Infected Patients in Federal Medical Centre, Owerri Imo State, Nigeria.

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Key words: Hepatitis B, Hepatitis B Virus, haematological parameters. Liver enzymes,

Background: Hepatitis B is a potentially life-threatening liver infection caused by hepatitis B virus. It is a major global health problem and the most serious type of viral hepatitis. In Hepatitis B virus infection, levels of some haematological parameters and liver enzymes are altered and this may lead to chronic liver disease and put people at high risk of death from liver cirrhosis and hepatocellular carcinoma.

Aim and Objectives: The aim of the study was to determine the levels of some haematological parameters and liver enzymes among hepatitis B virus infected patients at Federal Medical Center Owerri, Imo State. The objectives include; to determine the levels of packed cell volume (PCV), haemoglobin (Hb), total white blood cell (TWBC) counts, Red blood Cells (RBC), platelets and differential white blood cells of hepatitis B virus infected patients and non-infected subjects, to determine the levels of aspartate and alanine transminases of hepatitis B virus infected patients and non-infected subjects

Methodology: This was a cross-sectional study carried out at Federal Medical Center during the period of August – October, 2019. Twenty (20) hepatitis B Virus positive patients were recruited for the study using questionnaire and their age range was between 12 and 60 years. An equivalent number of 20 apparently healthy age-matched individuals were monitored as controls. The parameters were analyzed using standard techniques. Data generated were compared using SPSS.

Results: The levels of Hb (g/dl) (9.93 ± 1.11), PCV (%) (0.30 ± 0.03), and platelets ($x10^9$/l)(229.35 ± 58.08) were significantly decreased in the test groups when compared to the controls (12.46 ± 1.33), (0.37 ± 0.04) and (294.80 ± 78.13) respectively (p = 0.001). There was no significant difference in the mean level of WBC ($x10^9$/l) (5.34 ± 2.85), when compared to the controls (5.31 ± 0.91) (p = 0.955). The mean level of lymphocytes (%) (54.16 ± 6.37) was significantly reduced, while that of neutrophils (%) (44.38 ± 6.29) was significantly raised in the test group compared to the controls (60.40 ± 6.31) and (37.55 ± 6.94) respectively (p=0.001). There was no significant difference in the mean values of eosinophils (%) (1.12 ± 0.75) and monocytes (%) (0.16 ± 0.37) in the study group when compared to the controls (1.30 ± 0.73) and (0.30 ± 0.57) respectively (p = 0.363 and p=0.229). The ALT (iu/L) (29.35 ± 8.72) and AST (iu/l) (27.60 ± 8.47) in the test groups were significantly increased when compared to the controls (16.80 ± 3.64) and (15.15 ± 2.85) (p= 0.001).

Conclusion: The study has shown that levels of some haematological parameters and liver enzymes are altered remarkably in HBV infection. Therefore, their assessment is advocated in the prediction of the HBV programs.

HBTSSN-2020-014

Effect of Quality Indicator Measures on Turnaround Time (TAT) in a Selected Molecular Laboratory in Port Harcourt, Rivers State.

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Abstract

Background: Turnaround Time (TAT) is an important Quality Indicator in the medical laboratory. The Rivers State University Teaching Hospital (RSUTH) Polymerase Chain Reaction (PCR) laboratory was enrolled in the process of World Health Organisation (WHO) - Regional Office for Africa (AFRO) accreditation by FHi360 in preparation for the ISO 15189 accreditation in 2016. One of the services rendered in the laboratory is Early Infant Diagnosis (EID)/ Dried Blood Spots (DBS) in Human Immunodeficiency Virus (HIV) exposed infants. Clinicians depend on these results to determine the next step for the management of HIV exposed Infants. The aim of this study was to assess the rate of sample rejection (SR), determine the effect of specific intervention on this rate and the effect of SR on Turnaround Time (TAT).

Method: This was a prospective assessment of samples delivered to the RSUTH PCR Laboratory from August 2018 to March 2019. A baseline rate of sample rejection was established from January to July 2018. Interventional measures were put in place such as introducing the national algorithm for rejection and acceptance of samples, training was also done for EID sample collectors and a final assessment of changes in the rate of sample rejection was determined at the final period of January –March 2019.

Results: During the baseline period, sample rejection rate started at 5% in February and went back to 0% in March. In April however, the rate of rejection increased to 9%. There was a decline in rejection rate to 5% and 7% in May and June respectively. A sudden spike in rejection occurred in July at a rate of 19%. The major reasons for sample rejection were: DBS cards with insufficient blood spots, DBS cards with clots present in spots, DBS cards that have serum rings and grossly haemolysed DBS. After baseline samples were collected and interventions put in place. Sample rejection rate drastically reduced to 1%, 0% and 0% respectively from January to March which is way below the maximum threshold of 2% as advocated by WHO. At baseline EID TAT was longer than a month, however; with SR, the TAT increased to about seven weeks. The final assessment in March from this study showed a significant reduction in sample rejection to 0%.

Conclusion and Recommendations: This study has shown that quality improvement is achievable, if interventional tools are utilized promptly. This will result in shorter TAT; fewer samples will be rejected and will impact on prompt treatment of exposed infants thus reducing morbidity and mortality due to HIV.

HBTSSN-2020-015

Echelons of Some Haemoparasites Among Blood Donors in Port Harcourt, Rivers State, Nigeria

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ABSTRACT
Although the therapeutic application of whole blood and blood components can be life-saving, inadequate screening of these products could pose life-threatening problems to the recipient. The aim of this study was to determine the presence and echelons of some haemoparasites (malaria parasite, microfilaria and babesia species) among blood donors in Port Harcourt, Rivers State, Nigeria as well as quantifying their densities. A total of one hundred (100) prospective blood donors from the participating blood banks within 19-51 years were recruited for this study. Two millilitres (2mls) of venous blood was collected from the antecubital vein of each participant using standard venepuncture technique into ethylene diamine tetra acetic acid (EDTA) bottles and mixed properly to avoid blood clotting. Thick and thin blood films were used for the detection and quantification of haemoparasites. The data generated was analysed using statistical package for Social Sciences (SPSS) version 20. Of the 100 samples examined, 23 (23.0%) were positive for *Plasmodium falciparum.* The highest prevalence was among the males 13(13.0%), between the ages of 19-29 years and only 10(10.0%) of the females were positive while the lowest prevalence was between the ages of 41-51. No positive case was observed for microfilaria and babesia species. The mean malaria parasite density for male subjects was 0.43±0.23% while that of female subjects was 0.66±0.23%. The female subjects had significantly higher malaria parasite density than the males (p=0.03). The data obtained from this study provides information on the haemoparasite status, indicating level of malaria parasite among the prospective blood donors in Port Harcourt, Nigeria. It is therefore, recommended that malaria parasite screening test be included in the pre-blood donation blood screening tests to avert the deleterious effects of malaria parasite on the recipient and to enhance more wholesome blood for the purpose of transfusion.

Keywords: *Haemoparasites, Echelons, Malaria, Microfilaria, Babesia specie, Blood, Donors, Parasite density*

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Rh E/e Negative antithetical antigens not a rare phenomenon but a menace among Black African women of North-Western Nigeria.

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Abstract

Background: Africa is the ultimate source of modern humans and as such harbours more genetic variation than any other continent. For this reason, studies of the patterns of genetic variation in African populations are crucial to understanding how genes affect phenotypic variation, including disease predisposition. We investigated the prevalence and effect of rare Rh E/e negative on Black African women.

Materials and methods: Three millilitres of whole blood were collected from the patients and the red cells were screened for the presence of Rh antigens by Ortho Biovue system cassettes (AHG/Coombs) technique.

Results: We found no Rh null in all the studies, but we observed that Rh E/e negative antithetical antigen prevalence as follows: 3.9% among 240 children, 5.7% among 229 patients of mean age of 29 .97 years and existing only among the female folks and 8.2% among 500 pregnant women to 9.2% among 153 sick women admitted into a hospital. Of all the women with the Rh E/e negative, about 57.14% had history of obstetric haemorrhage, 50%, had transfusion due to anaemia, 78.57% had history of abortion, 14.29% had gynaecological cancers and 7.14% had pre-eclampsia. The Rh E/e negative antigen showed a statistical significant relationship with obstetric haemorrhage (<0.001), transfusion need/anaemia (p = 0.047), spontaneous abortion (p value = 0.003) and with gynaecological cancers (p value = 0.036) but not with pre-eclampsia (p value = > 0.05). Odd ratios of 12.90, 4.6, 6.14 and 5.625 at 95% CI for obstetric haemorrhage, anaemia, spontaneous abortion and gynaecological cancers were obtained respectively.

Conclusion: We concluded that the prevalence of Rh E/e negative antithetical antigens was high and cannot be said to be a rare occurrence among Black African women in North-western Nigeria with attendant health challenges.

Key words: RhE/e antithetical antigen, Black African women, Sokoto, Nigeria.

HBTSSN-2020-017

Effect of Injectable and Skin Patch Contraceptives on Some Haematologic and Haemostatic Parameters in Women Attending Selected Primary Healthcare Clinic in Eleme, Rivers State, Nigeria

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Abstract

Background: With the increasing economic recession in Nigeria and even globally, and the challenges associated with multi- parity, the need for family planning becomes vital and hence the use of contraceptives by many women. The aim of this study was to identify the effect of injectable (DEPO-PROVERA) and skin patch (IMPLANON) contraceptives on some haematological and haemostatic parameters in women attending a selected Primary Health Care in Port Harcourt, Rivers State.

Method: A total of 45 female subjects using contraceptives (31 using injectable contraceptive and 14 using skin patch contraceptive) aged 24 and 45 years. Thirty (30) apparently healthy of aged 25 and 45 were monitored as controls. Haematological parameters were analysed using SYSMEX KX-21-N autoanalyser. Fibrinogen, antithrombin, tissue and plasminogen activator were analysed using STAT FAX-2100 enzyme linked immunosorbent assay (ELISA) machine with reagents by Elabscience, Wuhan, China. Prothrombin time and activated partial thromboplastin time were analysed manually with reagents by Quimica Clinica Aplicada S.A, Spain. Data were analysed using Graph Pad Prism version 5.0 and a p-value of <0.05 was considered statistically significant. For haematological parameters, the results showed that there was statistically significant increase in mean ± SD values of packed cell volume 38.13 ± 2.28% versus 36.21 ± 3.07% ($p=0.0126$), haemoglobin 12.35 ± 0.79g/dL versus 11.56 ± 0.99g/dL ($p=0.0025$), white blood cells 6.17 ± 1.22 $x10^9$/L versus 5.26 ± 1.18 $x10^9$/L ($p=0.0143$) in women using injectable and skin patch contraceptives when compared to the control. Other parameters showed no statistically significant difference ($p>0.05$). For haemostatic parameters, results showed that there was statistically significant increase in mean ± SD values of antithrombin (38.48 ± 17.48/ml versus 21.02 ± 15.54ng/ml, $p=0.0011$) and tissue plasminogen activator (1.34 ± 1.35ng/ml versus 0.28 ± 0.46ng/ml, $p=0.0047$) in women using the two types of contraceptive, whereas there was a statistically significant decrease in activated partial thromboplastin time (28.11± 2.37s versus 29.87 ± 2.77s, $p<0.05$) in women on the both contraceptives. Other haemostatic parameters showed no statistically significant difference. Based on duration of use of contraceptive, there was no statistically significant difference ($p>0.05$) in women using skin patch; while for injectable, platelet count was higher in those who had used it for more than one year ($p=0.0139$). Comparing values obtained from using injectable and skin patch, there was no statistically significant difference in all the parameters. Using analysis of variance to compare values based on parity, there was no statistically significant difference. Conclusively, the increase in antithrombin and tissue plasminogen activator, and a decrease in activated partial thromboplastin time in women using IMPLANON and DEPO-PROVERA may likely predispose them to bleeding, therefore adequate monitoring of haemostatic parameters while taking these contraceptives is critical in order not to expose them to risk of haemorrhage.

Keywords: *Family planning, Injectable, Skin patch, Contraceptives, Haematologic, Haemostatic, Parameters, haemorrhage.*

HBTSSN-2020-018

Zero Defect in Haematological Diagnosis in Nigeria- Getting It Right First Time and All the Time

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Summary
The aim of the diagnostic laboratory as a business is to meet the requirements of the patient (customers) and make profit. The Medical Laboratory or Biomedical Scientist as an oracle of modern medicine convert raw materials (body fluids, reagents and consumables) to generate a finished product (diagnostic results that is accurate, precise, reproducible and timely). Clinicians need these results to offer the best possible evidenced-based care (diagnose diseases, guide treatment and determine prognosis) to the patient. Zero defect in haematological diagnosis in Nigeria is a possibility. It is feasible for laboratories to get the testing right first time and all the time. However, to achieve these objectives, there is need for a change of attitude and discipline in the carrying out of our professional responsibilities as specialists in diagnostic haematology. A laboratory that will achieve zero defect is one that have the following; quality management system (QMS), process driven testing based on SOPs, excellent document control program, robust internal quality control programme, participates in EQA, invest significantly in the CPD and monitor regularly the competency of staff, subject the laboratory to regular audits (internal and external including accreditation), objectively identify and remove waste from the process, manage objectively all incidents, accidents and near misses, operate appreciate intelligence, employ and retain the best qualified staff, create an enabling environment for suggestions by staff, carry our regular evaluation of satisfaction of her customers, operate a root cause analysis -oriented problem solving program, objectively manages inventory control, take long term strategic decisions, invest significantly on the occupation health of staff, implement effective housekeeping and implement due governance. Suboptimal and repeat testing in the haematology laboratory have far reaching implications; waste of reagent and consumables, loss of productivity and waste of analyst time, affect the wear and tear on analysers, delay the treatment of patients, affect customer satisfaction, negatively impact the agreed turnaround time and reputation of the laboratory and affect the profit made by the laboratory as a business. Funding to provide healthcare services in Nigeria is on the decline why the healthcare needs of the people are on the increase. To be able to survive in this austere environment, Laboratory Scientist must work smartly and objectively by taking steps to achieve zero defect in laboratory testing and reduce the cost of providing diagnostic service without compromising quality. There is need for change of attitude and discipline ensuring that we do things right all the time.

Keywords: *Zero Defect, Haematological Diagnosis, Nigeria*

HBTSSN-2020-019

Red cell and platelet indices among pre-eclamptic women assessing Antenatal Care in University of Calabar Teaching Hospital, Calabar, Cross River State, Nigeria.

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Abstract

Background: Pregnancy is a period in which a foetus develops inside the uterus. Preeclampsia is pregnancy induced hypertension and a complication of pregnancy after 20 weeks of gestation. The aim of this study was to assess some haematological parameters in preeclamptic women.

Method: The study was a cross-sectional study involving 45 preeclamptic women, 45 apparently healthy normal pregnant women and 38 non-pregnant women who served as control groups. BC-2800 Mindray, an automated multi-parameter blood cell counter was used to analyze the haematological parameters.

Result: The haemoglobin (97.24 ± 7.18)g/l, red cell count (4.64 ± 0.41)x10^{12}/l, haematocrit (34.21 ± 2.54)%, mean cell volume (70.22 ± 2.82)fl, mean cell haemoglobin (20.51 ± 0.87) pg were significantly lower ($p<0.05$) in the preeclamptic women compared to the apparently healthy normal pregnant women (115.3± 8.72)g/l haemoglobin, (4.68 ± 0.47)x10^{12}/l red cell count, (34.75 ± 3.73)% haematocrit, (70.49 ± 4.91)fl mean cell volume, (20.51 ± 1.59)pg mean cell haemoglobin and the non-pregnant women (129.23 ± 10.23)g/l haemoglobin, red cell count(5.33 ± 0.44)x10^{12}/l, haematocrit (42.17 ± 2.58)%, mean cell volume (79.56 ± 3.41)fl, mean cell haemoglobin (28.29 ± 1.49) pg.

Conclusion: The red cell indicies were significantly lower whereas platelet indicies appeared normal in preeclamptic women compared to apparently healthy normal pregnant women and non-pregnant women. This work suggests that markers of increased risk of anaemia are common among preeclamptic women.

Keywords: Pregnancy, Preeclampsia, Haemoglogin, Red cell indicies Haematocrit, Platelet indicies.

HBTSSN-2020-020

Measurement of Serum Hepcidin among Chronic Kidney Disease Patients in Rivers State, Nigeria.

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Background: The newfound peptide hormone that regulates iron concentration called hepcidin is a player in anaemia which has been accounted as a challenge among chronic kidney disease patients. One of the reasons for iron deficiency and in turn anaemia in these patients is the powerlessness of the kidneys to excrete hepcidin. This study aimed to measure serum hepcidin level among chronic kidney disease patients in Rivers State.

Method: An aggregate of 88 subjects were enlisted, 55(62.50%) chronic kidney disease patients and 33(37.50%) control subjects. Samples were collected and analysed at Braithwaite Memorial Specialist Hospital (presently Rivers State University Teaching Hospital) Port Harcourt, Rivers State, Nigeria. Serum hepcidin level was estimated utilizing commercial ELISA DRG Hepcidin-25 kit and questionnaire was used to collect sociodemographic information was analyzed using SPSS version 21.

Result: The mean value for Serum Hepcidin was 52.00ng/ml in the CKD patients while that for the Control Subjects was 16.00ng/ml. Statistical analysis indicated that Serum Hepcidin level was elevated significantly in CKD subjects (52.00ng/ml) when compared to controls (16.00ng/ml) ($t = 6.54$, $p<0.05$).

Conclusion and Recommendations: The raised Serum Hepcidin level observed among the Chronic Kidney Disease patients level diminishes iron availability for red blood cell production. The estimation of Serum Hepcidin level in CKD patients will improve the diagnosis, treatment and the management of anaemia in these patients.

Keywords: Serum Hepcidin, Chronic Kidney Disease, Anaemia

HBTSSN-2020-021

Peripheral Blood Assessment of Malaria infection on some Haematological Indices of Pregnant Women Attending Antenatal Clinic in Two Tertiary Hospitals in Port -Harcourt.

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Abstract

Background: Malaria is a global public health problem. Pregnant women are especially susceptible to malaria infection. This aim of this case- control study was to determine the effect of plasmodium parasitaemia on some haematological parameters of pregnant women attending antenatal clinic in two Tertiary Hospitals in Port -Harcourt.

Materials and Methods: Venous blood was drawn from 240 subjects comprising 80 malaria infected pregnant women, 80 non-infected pregnant women and 80 apparently healthy non-pregnant women. The subjects were recruited from the ante-natal clinics of University of Port Harcourt Teaching Hospital and Rivers State University Teaching Hospital. Ethical clearance was obtained from the Ethical Review Boards of the two tertiary Hospitals. Informed consent was obtained from all participants. Haematology auto analyzer (Sysmex KX21) was used for the analysis of haematological parameters. Malaria parasite was diagnosed by Microscopy, and pregnancy test was done using Rapid Diagnostic Kit. Data obtained were statistically analyzed using the Statistical Analysis Software (SAS version 9.4). One-way analysis of variance (ANOVA) was used for comparison of mean difference among the various groups and level of significance was set at $P<0.05$.

Results: The results of haematological parameters among the malaria-parasitized pregnant women were (WBC 7.24 ±0.20 $x10^3$/µL, RBC 3.94±0.04$x10^6$/µL, Hb 10.96±0.10 g/dl, PCV 33.00±0.30%, MCHC 33.18±0.17 g/dl, lymphocyte 1.94±0.05 $x10^3$/µL and platelet 202.43±5.31 $x10^3$/µL) compared to the non-infected pregnant women (WBC 7.22± 0.15 $x10^3$/µL, RBC 3.80±0.04 $x10^6$/µL, Hb 10.68± 0.10 g/dl, PCV 33.09± 0.24%, MCHC 32.38±0.11 g/dl platelet 214.83± 5.54 $x10^3$/µL, and lymphocyte 1.99±0.07 $x10^3$/µL) and the non- pregnant control (WBC 5.37±0.10 $x10^3$/µL, RBC 4.35±0.04 $x10^6$/µL, Hb 11.76±0.12 g/dl, PCV 34.17±0.30%, platelet 247± 6.19 $x10^3$/µL, MCHC 34.53± 0.13 g/dl, lymphocyte 2.39± 0.50 $x10^3$/µL). The total white blood cell count (TWBCC) and neutrophil count in the infected pregnant were significantly higher among the parasitized subjects compared to the non-parasitized controls ($p<0.05$). The Hb, PCV, platelets and red cell indices were significantly lower among the parasitized subjects compared to the non-parasitized controls ($p<0.05$).

Conclusion: The findings of this study showed a significant increase in the total white blood cell count (TWBCC) and neutrophil count in the parasitized pregnant women compared to controls. There was a significant reduction in the Hb, PCV, platelets and red cell indices in the malaria infected pregnant women compared to controls. This implies that malaria infection coexisting with pregnancy influences alterations in the haematological parameters. It is thus recommended that full blood count be routinely carried out among parasitized women to facilitate the care offered to the women. further studies be carried out to investigate the inverse relationship which existed between. Routine malaria prophylaxis should be provided for pregnant women in the area.

HBTSSN-2020-022

Trimester Dependent Derangements of Fibrinolytic Markers in Maternal *P. falciparum* Malaria infection in Port Harcourt, Nigeria

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Keywords: Maternal, Pregnancy, Malaria, Fibrinolytic Markers

Abstract

Background: Malaria in pregnancy often result to harmful effects which may involve the mother's health, the baby's health or both. The aim of this study was set to determine the effect of malaria infection in pregnancy on some fibrinolytic markers in women attending ante-natal clinic in University of Port Harcourt Teaching Hospital Port Harcourt.

Materials and Methods: A total of 160 subjects were recruited into this study made up of eighty (80) malaria infected pregnant women and 80 non-malaria infected pregnant women. Five milliliters (5ml) of venous blood was collected from each subject into ethylene diamine tetra acetic acid bottles. Three milliliters of the samples were collected into citrated tubes and used for the estimation of levels of fibrinogen, tissue plasminogen activator, D-dimer, plasminogen activator inhibitor 1, plasminogen activator inhibitor 2, plasminogen and α-2-antiplasmin. Blood samples for fibrinolytic markers were centrifuged for 15-minutes at 1000rpm within 30 to 45 minutes of collection. The supernatant plasma was drawn and transferred into plain tubes and stored in the refrigerator at -20^{o}C until tests were performed using enzyme linked immunosorbent assay while the remaining 2 milliliters used for the preparation of malaria parasite films.

Results: The results obtained in the analyses of fibrinolytic markers in the malaria non-infected pregnant women in the first trimester were fibrinogen 750.58±26.62 ng/ml, tPA 30.06±3.32 ng/ml, D-dimer 53.88±7.79 ng/ml, PAI-, 81.53±3.10 ng/ml, PAI-2 453.79±15.35 ng/ml, plasminogen 17.71±1.10 ng/ml and α-2-antiplasmin 1189.27±50.19 ng/ml, while that among the infected pregnant women were fibrinogen 777.79±23.59ng/ml, tPA 40.71±2.90 ng/ml, D dimer 83.00±6.91 ng/ml, PAI-1 92.46±2.74 ng/ml, PAI-2 567.79±13.61 ng/ml, plasminogen 23.66±0.97 and α-2-antiplasmin 1296.07±44.49 ng/ml. In the second trimester, the values in the non-infected pregnant women were fibrinogen 684.96±29.99 ng/ml, tPA 25.32±3.68 ng/ml, D-dimer 54.45±8.78 ng/ml, PAI-1 77.67±3.49 ng/ml, PAI-2 453.15±17.30 ng/ml, plasminogen 15.96±1.26 ng/ml and α-2-antiplasmin 1106.31±56.55 ng/ml respectively while the values in the infected pregnant women were fibrinogen 702.14±32.60 ng/ml, tPA 54.95±4.00 ng/ml, D-dimer 77.13±9.54 ng/ml, PAI-1 85.70±3.79 ng/ml, PAI 2 552.82±18.80 ng/ml, Plasminogen 26.01±1.34 ng/ml and α-2-antiplasmin 1283.45±61.47 ng/ml respectively. Finally, in the third trimester the values in the non-infected pregnant women were fibrinogen 630.38±33.36 ng/ml, tPA 31.45±4.10 ng/ml, D-dimer 53.22±9.77 ng/ml, PAI-1 80.46±3.88 ng/ml, PAI 2 464.19±19.24 ng/ml, Plasminogen 15.72±1.38 ng/ml and α-2-antiplasmin1068.50±62.92 respectively. Significantly increased variations ($p<0.05$) in the levels of fibrinogen and tPA was observed across the trimesters while non-significant increase ($p>0.05$) was observed in the levels of the other parameters across the trimesters.

Conclusion: The raised fibrinogen concentration observed in all the trimesters in this study confirms the hyperfibrinogenaemia which is a normal finding during pregnancy to maintain placental implantation. Due to the variations observed in the fibrinolytic markers at different trimesters in both malaria-infected and non-infected, this study recommends that haemostatic reference values for diagnosis and treatment of pregnant women be based on pregnant women's samples and reference values for fibrinolytic markers should be compared based on gestational age, not just on pregnancy.

Keywords: Trimester, Fibrinolytic Markers, P. *falciparum* Malaria, Pregnancy Port Harcourt, Nigeria

HBTSSN-2020-023

Effect of Lead Exposure on Coagulation Profile of Artisans in Abeokuta, Nigeria: A Pilot Study

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Background: Studies have demonstrated the nephrotoxic, hepatotoxic and artherogenic effects of workplace toxic metal exposure among artisans in Nigeria. However, there is paucity of information on its effects on coagulation profiles. This study assessed the coagulation profile of Nigerian artisans at high risk of occupational exposure to toxic metals.

Methodology: A total of thirty occupationally exposed artisans including ten (10) auto-mechanics, ten (10) panel beaters, ten (10) car painters as well as ten (10) civil servants with low exposure risk, were recruited for this study after obtaining informed consent. Blood samples were collected, processed and the extracted serum were assayed for lead (Pb), zinc (Zn) and copper (Cu) using Atomic Absorption Spectrophotometry. Prothrombin time and activated partial thromboplastin time were determined using the Innovin PT and Actin FS Activated PTT reagents on Sysmex-CA101 Coagulation analyser respectively. Data were expressed as mean ± SD. Statistical significance was set at $p<0.05$

Result: The mean age of study participants was 34.8±8.9 years with mean working period of 16.7±9.7 years. Significantly higher serum lead level was observed in car painters compared with controls (41.6 ± 12.6µg/Lvs25.0 ± 10.1µg/L, p=0.002). Significantly lower serum levels of zinc was observed in auto mechanics (82.3±34.6 µg/dL vs 118.62±22.2 µg/dL, p=0.01) and car painters (64.7 ± 13.2 µg/L vs 118.62 ± 22.2 µg/L, p=0.000) compared with controls. Statistically significant prolonged prothrombin time was observed in auto-mechanics (12.17 ± 0.38secs vs 11.20 ± 0.36 secs, p=0.000) and car painters (12.01 ± 0.83 secs vs 11.20 ± 0.36 secs, p=0.002) compared with controls. In auto-mechanics, serum zinc level negatively correlates with the prothrombin time (r = -0.718, p=0.019).

Conclusion: Increased blood lead level may affect certain extrinsic coagulation factors in occupationally exposed artisan. However, further studies are required to isolate the actual coagulation factor affected.

A Study of Iron Status and Total Serum Protein Levels in Blood Donors in Owerri, Imo State

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Abstract

Background: Haemoglobin level, Serum Ferritin, Serum Iron, Total Iron-binding Capacity (TIBC), Percentage Transferrin Saturation and Total Serum Protein levels were measured in three groups of individuals.

Materials and Methods. A total of 138 subjects were recruited for this study. These subjects were grouped into three based on the number of donation done in the last one year: Group A were individuals with a history of 1-3 donation, Group B 4-6 donations and Group C, 7-9 donations.

Results: The mean haemoglobin levels in group A, group B, and group C were 13.30±2.10g/dl, 9.76±1.83 g/dl, and 8.03±0.68g/dl respectively. In group A, the mean ±S.D values of serum ferritin, serum iron, TIBC, and % transferrin Saturation were 76.87±108.59, 92.64±24.63, 324.73±50.14, and 29.41±9.91respectively. In group B, the mean ±S.D of serum ferritin, serum iron, TIBC, and % transferrin Saturation were 1.56±2.73, 47.86±23.06, 426.41±117.63 and 11.07±5.53 respectively. The mean ±S.D of serum ferritin, serum iron , TIBC, and % transferrin Saturation were 0.92±2.05, 30.64±18.93, 470.55±67.92, and 8.27±7.41 respectively. The mean total serum protein of group A was 7.02±1.34g/dl, group B 6.90±0.57g/dl and group C 6.67±0.72g/dl. The WHO reference range for each parameter was obtained as Hb = 12.0 – 18.0g/dl, Serum ferritin = 8-385 ng/ml, serum iron = 60-150µg/dl, TIBC = 250-400 µg/dl, percentage transferrin saturation = 20-55% and serum protein = 6.2-8.5g/dl. The iron status level decreased according to the number of donations. All the iron profile parameters and Hb levels were found to have a significant difference ($P<0.05$) as frequency of blood donation increases. The total serum protein had no significant difference ($P>0.05$) with increase in frequency of donation.

Conclusion: However, from this study it was observed that iron deficiency was high in donors donating above the stipulated 2-3 donation per year. The implications of unregulated blood donations becomes apparent from the result of the study.

HBTSSN-2020-025

Assessment of Complete Blood Counts of *Cannabis Sativa* Smokers in Ekpoma, Edo State, Nigeria

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ABSTRACT

Background: *Cannabis sativa* (Marijuana) is an annual plant belonging to the family *cannabaceae* of the nettle order (urticales) it grows wild in warm and tropical climates throughout the world and is cultivated commercially. It is a known psychoactive substance, but for many years it was harvested primarily for its fiber. Cannabis preparations have been used to relieve nausea, improve appetite and reduce pain for thousand years. *Cannabis sativa* and *Nicotiana tobacum* (tobacco) are common drugs known today and the drugs have side effect on living cells of the system. Smoking leads to an appreciable rise in concentration of carboxyhaemoglobin which does not function in oxygen transport; an erythropoietin-mediated increase in erythropoiesis therefore occurs. Marijuana may increase factor vii activity, however, there are mixed results in terms of the effects of smoked marijuana on platelet function. Presently, there is an increase in the use of marijuana by young able-bodied Nigerians, cutting across sex divisions. There is paucity of information on the haematological status of marijuana users in this part of the country, the importance on blood constituents individually or collectively, to healthy living and the reality of the poor status of our country's economy for some time to come, with the government not succeeding in alleviating the situation effectively all crystallize to form the basis of this study, which assessed the effect of marijuana usage on complete blood counts in smokers in order to elucidate possible deviations from the non-smokers. Alcohol and Drug Education shows that marijuana use can weaken the immune system and interrupt maturation of white blood cells. Therefore, marijuana users may be more vulnerable to illness.

Aims and Objectives: The aim of this study is to assess the complete blood count of *Cannabis sativa* smokers and make comparison with non-smokers in Ekpoma, Edo State.

Materials and Methods: A total of one hundred subjects were recruited for this study which consist of Fifty (50) *Cannabis sativa* smokers and fifty (50) non Smokers which served as control. A complete record of medical and smoking history was obtained for each subject, with the use of the questionnaire. The samples obtained were taken to the laboratory for analysis using Sysmex KX auto analyzer.

Results: The result showed that the levels of WBC, RBC and granulocytes levels were significantly lower ($p<0.05$) in cannabis smokers as compared to the control. The levels of lymphocytes and monocytes were significantly higher ($p<0.05$) in cannabis smokers as compared to the control. Haemoglobin, packed cell volume and platelet levels were significantly different ($p<0.05$) in cannabis smokers as compared to the control. The MCV, MCH, MCHC, RDW, PDW and MPV values of cannabis smokers were significantly different ($p<0.05$) as compared to the control subjects.

MINOR RED CELL ANTIGEN PHENOTYPES AND ASSOCIATION WITH *HELICOBACTER PYLORI* INFECTION IN STUDENTS OF A TERTIARY INSTITUTION

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ABSTRACT
Background*: Helicobacter pylori (H.pylori)*, a bacterial pathogen, is a risk factor of diminished cognitive development, ubiquitous and infect both males and females. It is usually found under the mucus layer in the gastric pits where it causes chronic active gastritis, peptic ulcer disease and is a strong risk factor for the development of gastric cancer. These conditions alter haematological indicators variably but there is dearth of information on the association of *H.pylori* and blood group antigens.
Materials and Methods: The broad objective of this study was to determine the relationship between erythrocyte blood group antigens and *Helicobacter pylori* infection. 181 consenting students' blood sample were screened for *H. pylori* after the administration of a structured questionnaire using rapid technique. Blood group of each subject was phenotyped to determine the red cell antigen profile using a wide range of antisera against D, C, c, E, e, M, N, S, s, K, k, Le^a, Le^b, Kp^a, Kp^b, Lu^a, Lu^b, Fy^a, Fy^b, Jk^a and Jk^b antigens by mictotitre saline(IgM) and enhancement(IgG) techniques.
Results: An overall prevalence of 27% was recorded in the sample population. The distribution of the red cell antigens in the infected and control group was variable, but there was a significant association ($P<0.05$) between the presence of Lu^a, Fy^a, Fy^b, Jk^a and Jk^b and *H. pylori* infection. The prevalence of infection is alarming in the population considering the impact it may have on cognitive development and other haematological variables previously reported which may affect general performance.
Conclusion: The observation of the association of the aforementioned antigens and *H.pylori* infection warrants further studies in other populations with larger samples needed to confirm this novel finding.

HBTSSN-2020-027

Leucocyte Phagocytic Activity of HIV Positive Individuals in Umuahia, South-Eastern Nigeria

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ABSTRACT

Background: Phagocytes are white blood cells that protect the body by ingesting harmful and unwanted foreign particles, including bacteria and dead or dying cells. This study was conducted to determine white cell phagocytic activity in Human Immunodeficiency Virus (HIV) infection. **Materials and Methods**: One hundred HIV-positive patients were enrolled in this study while fifty apparently healthy seronegative individuals served as controls.

Results: The haemoglobin estimation, haematocrit, total white blood cell count (TWBC count), platelet count were analysed using conventional manual method, the TWBC was repeated after incubation with carbonyl iron powder at 37°C, while CD4 count was analysed using Partec Cyflow counter. The TWBC count of the controls before incubation with carbonyl iron powder (CIP) was 6096 ± 7196 (/mm^3) while after incubation with CIP was 4074 ± 1657 (/mm3). The percentage reduction was observed to be higher before incubation with CIP -33.2 ± 92 (%)- and after incubation -49.6 ± 20 (%)- of the control at $p < 0.05$. Significant differences were observed in neutrophils, eosinophils, monocytes, lymphocytes, basophils, haemoglobin concentration, haematocrit and platelet count of the control 45 ±7.2 (%), 3 ± 1.2 (%), 4 ± 1.4 (%), 41 ± 12 (%), 0 (%),12 (g/dl), 38 ± 64 (%), 211 ± (x 10^9/L); when compared with the test 20.7 ± 11.0 (%), 1 ± 1.4 (%), 2 ± 1.7 (%), 28 ± (10%), 9.2 (g/dl), 27 ± 39 (%), 90 (x 10^9/L) ($p<0.05$). There was equally a significant difference in the value of CD4 count of the controls 864 ± 266 cells/µL when compared with the test 420 ± 203 cells/ µL at $p < 0.05$. CD4 count has a positive correlation with TWBC.

Conclusion: All patients living with HIV should have their immune status monitored regularly to forestall inability of the system to perform phagocytosis, when required.

HBTSSN-2020-028

Haematoimmunological and Histological Profile of Tramadol Intoxication in Rats

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ABSTRACT

Background: Tramadol is a synthetic, and centrally acting analgesic which is used worldwide. But its use is devoid of many serious adverse effects of tramadol opioids. However, recently, abuse and dependence as well as toxicity and tramadol-related deaths have been increasingly reported. The rate at which tramadol is highly patronized in the society and escalated crime due to the toxicity and dependence has attracted the concern of researchers. This study was aimed at evaluating the haematological, immunological, and histological profile of tramadol intoxication in adult albino rats.

Materials and Methods: In order to achieve this, 50 adult male rats of homogenous weight were enrolled in the study in two stages: acute and chronic. The acute stage consisted of a control group (group 1) of 6 rats administered with normal saline solution, and a treatment group (group 2) of 6 rats administered with lethal dose of tramadol. The control group of the chronic stage (group 1) consisted of 6 rats that were also administered with normal saline solution. Whereas the tramadol-dependent groups comprised of 3 groups of 6 rats each administered orally with 50 mg/kg, 100 mg/kg, and 200 mg/kg of tramadol for a period of 90 days. Observed behavioural changes and manifestations were recorded during the acute and chronic stages of the study.

Results: from the acute stage of the study showed that the packed cell volume (PCV) in the treatment group (51.00 ± 2.96%) was significantly higher (t = 3.99, p = 0.002) than control (37.83 ± 1.43%). Similarly, the haemoglobin concentration (Hb) in the treatment group (14.70 ± 0.46 g/dl) was significantly higher (t = 5.10, p = 0.005) than control (11.55 ± 0.41 g/dl). The mean cell haemoglobin concentration (MCHC) was significantly lower (t = 2.67, p = 0.02) in the control group (28.30 ± 0.52 g/dl) than treatment (30.43 ± 0.61 g/dl). The mean CD4 count was also significantly lower (t = 3.75, p = 0.003) in the control group (4.67 ± 0.67 cells/µl) relative to the treatment (8.17 ± 0.67 cells/µl). Results from the chronic stage showed a progressive increase in platelet count which was proportional to increasing dosage of treatment (t = 8.59, p = 0.007). Conversely, the CD4 count was elevated up to 100 mg/kg and then dropped to baseline at 200 mg/kg (t = 3.12, p = 0.04). Histological sections of the liver and kidney of treatment groups showed epithelial necrosis and inflammatory cellular infiltration when compared to control group. This study has demonstrated that tramadol administration may cause haematoxicity, hepatotoxicity and nephrotoxicity. Further ex vivo studies should be carried out to buttress or debunk the immune-enhancement and thrombocytic property of acute and chronic tramadol administration on the CD4 count.

Conclusion: There is need to avoid indiscriminate and prolonged use of tramadol which may lead to accumulated tissue damage.

HBTSSN-2020-029

Knowledge/Attitude Towards Blood Donation and Prevalence of Hepatitis B and C among Secondary School Teachers in Calabar

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ABSTRACT

Background: Blood donation is the process where by a person's blood is drawn to be used for transfusion or biopharmaceutical medication. It is an indispensable component of health care as it contributes to saving lives since blood/blood products are unique. Major source of safe blood is voluntary non-remunerated blood donors. **Aim:** This study is aimed at providing information on the knowledge/attitude towards blood donation and the prevalence of Hepatitis B and C among secondary school teachers in Calabar, Nigeria. **Methodology:** With ethical approval and informed consent, a total of 200 apparently healthy teachers were recruited from two secondary schools in Calabar. Structured questionnaires were administered to assess knowledge/attitude towards blood donation and blood was collected and screened for the presence of hepatitis B and C using standard strip method. Data obtained were analyzed using Chi-square test and $p<0.05$ was considered statistically significant. **Results**: The study subjects comprised of males (49.5%) and females (50.5%) with 38% being within the ages of 27-37 years. Majority (67.5%) had attained tertiary level of education while the remaining 32.5% had secondary education. The results showed that 95% of the participants think voluntary blood donation is good with 100% affirming that it is important yet only 10% had actually donated blood. Eight percent of the study participants had been in need and received blood transfusion previously. A good number (87% and 65%) were willing to donate if the recipient is a family member and in case of emergency. Eighty-four and half percent of respondents think that blood donation is beneficial, 78% think there is lack of awareness while 70% would advise others to donate blood voluntarily. Of the 200 participants, 66% believe blood donation to be a civic duty yet 82% and 85.5% respectively were of the opinion that blood donors should be paid or given gifts; indeed 83% agreed they would donate if paid. None of the respondents were against blood donation but 13% believed that blood donation poses risk of collapse or death to the donor. The prevalence of Hepatitis B and C was observed to be 10% and 4% respectively among the study population. **Conclusion:** This study has shown that secondary school teachers have good knowledge of blood donation, agree that it is important but are not willing to donate without renumeration. Lack of voluntary non-remunerated donation leads to shortage of safe blood for transfusion and will promote commercial donation with associated risks. There is need for regular awareness campaigns and blood drive among the populace.

Key words: Attitude; Blood donation, Hepatitis B and C

ABSTRACT FOR POSTER PRESENTATION

HBTSSN-2020-030

Pilot and Acute Toxicity Evaluation of Carmoisine Intraperitoneally Administered on Haematological Indices of Albino Rats

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ABSTRACT

Pilot and acute toxicological effect carmoisine on haematological indices of albino rats were investigated. Carmoisine is a nitrous derivative synthetic food dye belonging to the azo class of food dyes that gives food products reddish appearance with an ADI of 0 – 4.0mg/kg. It is bio-transformed in the liver to aromatic amines, aryl amines and other free radicals. It is seen in food products such as sweets, jams, sausage roll, rice, yoghurts, cake mixes, jellies and so on. It is soluble in water and tends to react with food particles covalently. A total of 34 albino rats weighing approximately 0.15kg were used. Statistical analysis was done using Graphpad Prism version 5.03 and results obtained were expressed as Mean±SD. One Way ANOVA with Post Hoc done using Turkey's multiple tests was the inferential statistics used. Statistical significance were set at $p<0.05$. In the pilot study, carmoisine doses used were 0.0g/kg, 0.17g/kg, 0.50g/kg, 1.0g/kg, 1.53g/kg, 2.0g/kg, 2.5g/kg, 3.33g/kg, 4.17g/kg, and 5.0g/kg. From the pilot study, the LD_{100} of carmoisine was determined to be 2.0g/kg. The pilot study was for a period of 24 hours with a total 10 rat used. In the acute study, treated groups were designated A_{CIP}, B_{CIP}, C_{CIP}, D_{CIP}, E_{CIP} and F_{CIP} with doses of 0.0g/kg, 0.17g/kg, 0.50g/kg, 1.0g/kg, 1.53g/kg and 2.0g/kg after LD_{100} determination. A total of 24 rats were used in the acute study. Each group had 4rats/group. In the methodology, haematological parameters were analysed using BS 800 haematology autoanalyser. Results obtained showed the LD_{50} of carmoisine was 1.25g/kg for intraperitoneal administration. Results of the acute study also showed significantly decreased HB ($p=0.0025$, $F= 5.703$), HCT ($p=0.0023$,$F= 5.830$), RBCs ($p=0.0009$, $F=7.007$, PLT ($p=0.0220$, $F=3.497$), WBCs ($p=0.0230$, $F=3.457$) Neutrophil ($p=0.0021$, $F=5.903$), Eosinophil ($p=0.0006$, $F=7.551$) and Basophil ($p=0.0024$, $F=5.761$) as doses were increased across the groups while Lymphocytes ($p=0.0133$, $F=3.969$) and Monocytes ($p=0.0476$, $F=2.815$) indicated significant increases as doses were increased across the groups. This study indicated that use of carmoisine intraperitoneally at high doses induced cytotoxic effect and immunologic reactions. It is therefore recommended that carmoisine dyes should be used with caution and high doses should be avoided.

HBTSSN-2020-031

Amelioration of some Immunological and Haematological Changes using Anti-Rheumatic Herbal Formulations in Albino Wistar Rats

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Aim: The aim of this study was to investigate the ability of some anti-rheumatic herbal formulations to ameliorate the immunological and haematological changes associated with rheumatoid arthritis in wistar rats

Methodology: Forty-nine (49) female albino wistar rats were used for this study. They were divided into seven groups, A, B, C, D, E, F, G, with each group containing seven rats. Rheumatoid arthritis was induced in Groups B to G with the injection of 0.1ml of Complete Freund's Adjuvant (CFA) into the right hind paw of each rat. Group A served as the negative control group, Group B was the positive control, Group C was treated with 36mg/kg body weight of Celebrex (a standard anti-rheumatic drug), Group D was treated 126mg/kg body weight of Jointeez (a herbal drug), Group E was treated with 180mg/kg body weight of Arthropower (a herbal drug), Group F was treated with a combination therapy of Jointeez and Celebrex while Group G was treated with a combination therapy of Arthropower and Celebrex. Treatments were administered daily for 28 days using oral gavage. On the 29th day, after an overnight fast, the rats were anaesthesized with chloroform and sacrificed through jugular vein puncture. 5ml of blood was put into plain bottles for the analysis of biochemical parameters and 3ml put into EDTA bottles for the assay of haematological parameters. TNF-α, IL-6 and C-reactive protein, were analysed using ELISA technique. CD4 count was performed using FACSCount automation while the haematological parameters were determined using Sysmex haematology autoanalyzer.

Results: The levels of TNF-α ($p=0.001$), IL-6 ($p=0.02$) and C-reactive protein ($p=0.02$) were significantly lower in the treated rats compared to the positive control group. Conversely, there were significant increases in the packed cell volume (PCV) ($p=0.001$), haemoglobin (Hb) ($p<0.001$) and CD4 counts ($p=0.002$), in the treated rats compared to the positive control group. There was also a significant decrease in the total white blood cell (TWBC) count in the treated rats ($p<0.001$), compared to the positive control rats.

Conclusion: The herbal formulations (Jointeez and Arthropower) used for this study significantly reduced immunological alterations in the treated rats and also normalized changes in haematological parameters. The herbal formulations offered similar therapeutic activities as the orthodox drug (Celebrex). The combination therapies used in this study did not offer significantly different therapeutic advantage over the monotherapies. Thus, the herbal formulations can be used as alternative therapies and could be incorporated in the management of rheumatoid arthritis.

HBTSSN-2020-032

Activated Protein C resistance uncovered as a contributor to thrombotic disorders in Southwestern Nigeria.

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ABSTRACT

Background: Activated protein C resistance (APCr) is an hypercoagulable condition in which there is resistance of the activated Factor V to cleavage by activated protein C resulting in poor anticoagulant response with an increased risk for venous thromboembolism (VTE). Thrombotic disorders are serious disorders with high morbidity and mortality rates known to be consequences of many genetic and acquired risk factors such as APCr which is found in about 5% European Caucasians and 1.2% Asians and North Africans. The manifestation of APCr in thrombotic disorder often require the presence of risk factors such as malignancy, pregnancy, trauma, surgery, the use of oral contraceptives and the presence of an antiphospholipid antibody.

Methods: Nine hundred (900) subjects comprising of six hundred pregnant subjects (600) and three hundred (300), apparently healthy, non-pregnant women who served as controls were recruited from tertiary hospitals across five states of Southwestern Nigeria vis a vis Ekiti, Oyo, Osun, Lagos and Ogun states. Questionnaire was administered to obtain the clinical history of the participants and parameters assessed include packed cell volume (PCV); Platelet count (Mindray analyser); haemoglobin electrophoresis by alkaline electrophoresis; Prothrombin time (PT) and activated partial thromboplastin time (APTT) tests (Diagen Ltd); D-dimer (Tina Quant Gen II, Roche Cobas CII analyser) and Activated Protein C resistance assays (Chromogenix Coatest, Diapharma).

Results: The results showed a significantly increased D-dimer (2.27±1.00) in the subjects while other coagulation markers were significantly reduced ($p<0.05$). The prevalence of APC-V ratio <2.0 among the studied population is 1.0 % (nine subjects) with 1.2 % among subjects and 0.7% among controls. These nine subjects with APCr were assessed to possess normal PCV; reduced PT (<11secs) and APTT (<25secs); increased D-dimer (>0.50ugFEU/ml); reduced APC-V ratio <2.0; they are either HbAA or Hb AS and six of them exhibit recurrent thrombosis associated symptoms. Also, four of them have history of Caucasian background. In addition, it was observed that some subjects without APCr possess reduced and increased levels of PT/APTT and increased D- dimer simultaneously.

Conclusion: This study concludes that APC resistance exists in a minute prevalence (1.0%) in this region with the manifestation observed in the assays and symptoms of the pregnant women especially recurrent lower limb pains. Furthermore, this study has revealed that the APCr mutation is not related or dependent on the haemoglobin genotype of an individual; it also revealed likelihood of detecting some other coagulation disorders that could result in thrombotic complications contributing to maternal mortality.

Keywords: Activated Protein C resistance, Thrombotic disorders, Coagulation disorders

HBTSSN-2020-033

IMPACT OF DONOR SCREENING ON DETECTION OF NEW HIV CASES; A RETROSPECTIVE STUDY ON DETERMINANTS OF VOLUNTARY UPTAKE OF HIV COUNSELLING AND TESTING AMONG INFECTED PERSONS IN CALABAR, NIGERIA

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Abstract

Background: Human Immunodeficiency Virus (HIV) infection remains a public health challenge. Incidentally, not everyone is aware of his/her HIV status. Thus, undetected cases of HIV infection continue to pose serious challenges in combating spread of the infection. Hence the need to investigate determinants of voluntary uptake of HIV counselling and testing (HCT) among infected persons in given populations.

Objective: This study on donor screening as part of the determinants for retrospective uptake of voluntary HCT among infected persons in Calabar aimed at identifying psycho-social factors for HCT uptake in this locality. The study particularly looked into the contribution of donor screening towards detection of new HIV cases.

Methods: A pre-tested structured questionnaire was administered for data collection on the determinants of voluntary HCT uptake among the infected persons. Ethical approval was obtained from the Health Research Ethical Committee (HREC) of University of Calabar Teaching Hospital. Informed consent was obtained from each participant enrolled in the research and confidentiality was maintained.

Results: The participants consisted of 100 male and female HIV-infected adults with mean age value of 37.4±9.7yeaars. More females (70%) than males (30%) were recorded, while 44% of all the participants were married. Uptake of voluntary HCT was dominantly controlled by enrollment for antenatal care (52%), followed by intention to donate blood (13%). This incidentally displayed a distribution specific to females and males respectively among the participants. Some of the subjects were diagnosed for the infection during hospital visit for other medical conditions (12%), while premarital screening at the instance of some churches as well as employment-related medical examination (10%) also contributed to the uptake of HCT among the study subjects. The rest of them opted for HCT after their sexual partners were diagnosed (9%) and very few in response to campaigns (4%).

Conclusion: Among the health programmes that incorporate HCT, blood donation was the second highest reason for uptake of voluntary HIV counselling and testing among the studied population.

Key words: Blood donation, Human Immunodeficiency Virus (HIV), HIV Counselling and Testing (HCT)

HBTSSN-2020-034

PREVALENCE OF MALARIA PARASITAEMIA AMONG BLOOD DONORS USING LONG-LASTING INSECTICIDE-TREATED NETS IN CALABAR, NIGERIA

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Abstract

Background: Transfusion therapy is a form of treatment based on the use of blood and its products on humans. However, the risk of malaria transmission through transfusion remains a source of concern especially because malaria is not among the routinely screened transfusion transmissible infections. This study aimed at investigating the effect of utilizing long-lasting insecticide-treated nets on malaria parasitaemia and its prevalence among blood donors.

Method: The participants for this study were 100 apparently healthy consenting male blood donors within the ages of 18-50 who were fit to donate. Participants were screened for malaria by microscopy using Giemsa stain.

Results: Subjects within the age group of 20-30 engaged more in blood donation (58%), than the other age groups recorded. Majority (46%) of the donors were students while the civil servants (24%) were the least participants in blood donation. The prevalence of malaria among donors utilizing long-lasting insecticide-treated nets was observed to be 12%.

Conclusion: Utilization of long-lasting insecticide-treated nets among donors has prospects for better transfusion outcome.

Key words: malaria, blood donation, transfusion transmissible infection

HBTSSN-2020-035

IMPACT OF ROUTINE CHECKS ON SELECTED INDICATORS OF HAEMOLYSIS AMONG SICKLE CELL ANAEMIA SUBJECTS IN CALABAR, SOUTHERN NIGERIA

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ABSTRACT

Background: This research was carried out to assess impact of routine checks on selected indicators of haemolysis among sickle cell anaemia patients attending Haematology clinic at the University of Calabar Teaching Hospital, Calabar.

Methods: Blood sample was collected from each participant, while age and regularity of routine checkup were retrieved from the patient's folders Blood samples were analyzed by standard methods. The red cell parameters were analysed by automation using FY-Smart-1 auto haematology analyzer, while bilirubin assay was performed using the colorimetric method.

Results: The haemoglobin concentration and haematocrit values of SCA subjects were significantly lower ($p=0.001$) compared to values from control subjects, while the red cell distribution width values were increased in SCA subjects ($p=0.001$). Total bilirubin, conjugated bilirubin and unconjugated bilirubin were also significantly increased ($p=0.001$) among SCA subjects. Elevated bilirubin values were more pronounced among subjects with irregular checkup compared to those with regular checkup.

Conclusion: Irregular routine checkup impacts adversely on sickle cell anaemia as evidenced in the elevation of both total and unconjugated bilirubin values.

Key words: Sickle cell anaemia, haemolysis, bilirubin

HBTSSN-2020-036

PROPORTIONS OF DERANGEMENT IN SOME HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF HIV-INFECTED PERSONS IN CALABAR, NIGERIA

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Abstract

Background: Derangement of haematological and biochemical parameters are implicated in HIV infection but information on actual proportion of infected persons with the derangements remains vague. This study, conducted at University of Calabar Teaching Hospital Calabar, looked into the proportions of some haematological and biochemical derangements among HIV-infected persons.

Methods: Ethical approval was obtained from the Health Research Ethical Committee (HREC) of University of Calabar Teaching Hospital. Informed consent was obtained from each participant enrolled in the research and confidentiality was maintained. One hundred female (70%) and male (30%) HIV-infected adults (37.4±9.7 years) with equal age and sex-matched control subjects participated. The haemoglobin concentration, CD_4T-cell count, white blood cell count, total protein, albumin, globulin, zinc, selenium and vitamin C were analyzed by standard methods.

Results: Proportions of infected subjects with reduced haemoglobin concentration, white blood cell and CD_4T-cell counts were 45%, 56% and 53% respectively. About a quarter (24%) of these subjects had low total protein values, 44% had reduced albumin levels and 63% showed increased globulin values. Selenium deficiency occurred in 14%, zinc deficiency in 42% and vitamin C deficiency in 100% of the infected subjects. The haemoglobin concentration (119.2±14.2g/L), CD_4T-cell (496.33±209.87cells/µL) and white blood cell count (4.65±1.52 x 10^3/µL) of the infected persons were significantly lower compared to control subjects (135.7±15.9g/L, 788.54±294.71cells/µL and 5.54±1.28 x 10^3/µL respectively). Among the infected persons, total protein (75.40±15.01g/L vs 70.86±8.03g/L) and globulin (41.42±15.85g/L vs 31.72±9.00g/L) increased significantly, while albumin level (34.04±8.44g/L vs 38.76±5.76g/L) was reduced. There was raised selenium concentration (85.38±18.06µg/dL) but reduced levels for zinc (71.22±14.84µg/dL) and Vitamin C (0.37±0.09mg/dL) among the infected subjects compared to controls (56.26 ± 17.48µg/dL, 135.92 ± 22.75µg/dL and 1.12 ± 0.44mg/dL respectively).

Conclusion: While different proportions of the infected persons showed deviations in the measured parameters, Vitamin C depletion was the commonest (100%) derangement among the studied population.

Key words: Human Immunodeficiency Virus (HIV), Derangement

ABSTRACT FOR POSTER PRESENTATION

HBTSSN-2020-P001

Pilot and Acute Toxicity Evaluation of Carmoisine Intraperitoneally Administered on Haematological Indices of Albino Rats

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ABSTRACT

Pilot and acute toxicological effect carmoisine on haematological indices of albino rats were investigated. Carmoisine is a nitrous derivative synthetic food dye belonging to the azo class of food dyes that gives food products reddish appearance with an ADI of 0 – 4.0mg/kg. It is bio-transformed in the liver to aromatic amines, aryl amines and other free radicals. It is seen in food products such as sweets, jams, sausage roll, rice, yoghurts, cake mixes, jellies and so on. It is soluble in water and tends to react with food particles covalently. A total of 34 albino rats weighing approximately 0.15kg were used. Statistical analysis was done using Graphpad Prism version 5.03 and results obtained were expressed as Mean±SD. One Way ANOVA with Post Hoc done using Turkey's multiple tests was the inferential statistics used. Statistical significance were set at $p<0.05$. In the pilot study, carmoisine doses used were 0.0g/kg, 0.17g/kg, 0.50g/kg, 1.0g/kg, 1.53g/kg, 2.0g/kg, 2.5g/kg, 3.33g/kg, 4.17g/kg, and 5.0g/kg. From the pilot study, the LD_{100} of carmoisine was determined to be 2.0g/kg. The pilot study was for a period of 24 hours with a total 10 rat used. In the acute study, treated groups were designated A_{CIP}, B_{CIP}, C_{CIP}, D_{CIP}, E_{CIP} and F_{CIP} with doses of 0.0g/kg, 0.17g/kg, 0.50g/kg, 1.0g/kg, 1.53g/kg and 2.0g/kg after LD_{100} determination. A total of 24 rats were used in the acute study. Each group had 4rats/group. In the methodology, haematological parameters were analysed using BS 800 haematology autoanalyser. Results obtained showed the LD_{50} of carmoisine was 1.25g/kg for intraperitoneal administration. Results of the acute study also showed significantly decreased HB ($p=0.0025$, $F= 5.703$), HCT ($p=0.0023$,$F= 5.830$), RBCs ($p=0.0009$, $F=7.007$, PLT ($p=0.0220$, $F=3.497$), WBCs ($p=0.0230$, $F=3.457$) Neutrophil ($p=0.0021$, $F=5.903$), Eosinophil ($p=0.0006$, $F=7.551$) and Basophil ($p=0.0024$, $F=5.761$) as doses were increased across the groups while Lymphocytes ($p=0.0133$, $F=3.969$) and Monocytes ($p=0.0476$, $F=2.815$) indicated significant increases as doses were increased across the groups. This study indicated that use of carmoisine intraperitoneally at high doses induced cytotoxic effect and immunologic reactions. It is therefore recommended that carmoisine dyes should be used with caution and high doses should be avoided.

HBTSSN-2020-P002

AMELIORATION OF SOME IMMUNOLOGICAL AND HAEMATOLOGICAL CHANGES USING ANTI-RHEUMATIC HERBAL FORMULATIONS IN ALBINO WISTAR RATS

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Aim: The aim of this study was to investigate the ability of some anti-rheumatic herbal formulations to ameliorate the immunological and haematological changes associated with rheumatoid arthritis in wistar rats

Methodology: Forty-nine (49) female albino wistar rats were used for this study. They were divided into seven groups, A, B, C, D, E, F, G, with each group containing seven rats. Rheumatoid arthritis was induced in Groups B to G with the injection of 0.1ml of Complete Freund's Adjuvant (CFA) into the right hind paw of each rat. Group A served as the negative control group, Group B was the positive control, Group C was treated with 36mg/kg body weight of Celebrex (a standard anti-rheumatic drug), Group D was treated 126mg/kg body weight of Jointeez (a herbal drug), Group E was treated with 180mg/kg body weight of Arthropower (a herbal drug), Group F was treated with a combination therapy of Jointeez and Celebrex while Group G was treated with a combination therapy of Arthropower and Celebrex. Treatments were administered daily for 28 days using oral gavage. On the 29th day, after an overnight fast, the rats were anaesthesized with chloroform and sacrificed through jugular vein puncture. 5ml of blood was put into plain bottles for the analysis of biochemical parameters and 3ml put into EDTA bottles for the assay of haematological parameters. TNF-α, IL-6 and C-reactive protein, were analysed using ELISA technique. CD4 count was performed using FACSCount automation while the haematological parameters were determined using Sysmex haematology autoanalyzer.

Results: The levels of TNF-α ($p=0.001$), IL-6 ($p=0.02$) and C-reactive protein ($p=0.02$) were significantly lower in the treated rats compared to the positive control group. Conversely, there were significant increases in the packed cell volume (PCV) ($p=0.001$), haemoglobin (Hb) ($p<0.001$) and CD4 counts ($p=0.002$), in the treated rats compared to the positive control group. There was also a significant decrease in the total white blood cell (TWBC) count in the treated rats ($p<0.001$), compared to the positive control rats.

Conclusion: The herbal formulations (Jointeez and Arthropower) used for this study significantly reduced immunological alterations in the treated rats and also normalized changes in haematological parameters. The herbal formulations offered similar therapeutic activities as the orthodox drug (Celebrex). The combination therapies used in this study did not offer significantly different therapeutic advantage over the monotherapies. Thus, the herbal formulations can be used as alternative therapies and could be incorporated in the management of rheumatoid arthritis.

HBTSSN-2020-P003

Activated Protein C resistance uncovered as a contributor to thrombotic disorders in Southwestern Nigeria.

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ABSTRACT

Background: Activated protein C resistance (APCr) is an hypercoagulable condition in which there is resistance of the activated Factor V to cleavage by activated protein C resulting in poor anticoagulant response with an increased risk for venous thromboembolism (VTE). Thrombotic disorders are serious disorders with high morbidity and mortality rates known to be consequences of many genetic and acquired risk factors such as APCr which is found in about 5% European Caucasians and 1.2% Asians and North Africans. The manifestation of APCr in thrombotic disorder often require the presence of risk factors such as malignancy, pregnancy, trauma, surgery, the use of oral contraceptives and the presence of an antiphospholipid antibody.

Methods: Nine hundred (900) subjects comprising of six hundred pregnant subjects (600) and three hundred (300), apparently healthy, non-pregnant women who served as controls were recruited from tertiary hospitals across five states of Southwestern Nigeria vis a vis Ekiti, Oyo, Osun, Lagos and Ogun states. Questionnaire was administered to obtain the clinical history of the participants and parameters assessed include packed cell volume (PCV); Platelet count (Mindray analyser); haemoglobin electrophoresis by alkaline electrophoresis; Prothrombin time (PT) and activated partial thromboplastin time (APTT) tests (Diagen Ltd); D-dimer (Tina Quant Gen II, Roche Cobas CII analyser) and Activated Protein C resistance assays (Chromogenix Coatest, Diapharma).

Results: The results showed a significantly increased D-dimer (2.27±1.00) in the subjects while other coagulation markers were significantly reduced ($p<0.05$). The prevalence of APC-V ratio <2.0 among the studied population is 1.0 % (nine subjects) with 1.2 % among subjects and 0.7% among controls. These nine subjects with APCr were assessed to possess normal PCV; reduced PT (<11secs) and APTT (<25secs); increased D-dimer (>0.50ugFEU/ml); reduced APC-V ratio <2.0; they are either HbAA or Hb AS and six of them exhibit recurrent thrombosis associated symptoms. Also, four of them have history of Caucasian background. In addition, it was observed that some subjects without APCr possess reduced and increased levels of PT/APTT and increased D- dimer simultaneously.

Conclusion: This study concludes that APC resistance exists in a minute prevalence (1.0%) in this region with the manifestation observed in the assays and symptoms of the pregnant women especially recurrent lower limb pains. Furthermore, this study has revealed that the APCr mutation is not related or dependent on the haemoglobin genotype of an individual; it also revealed likelihood of detecting some other coagulation disorders that could result in thrombotic complications contributing to maternal mortality.

Keywords: Activated Protein C resistance, Thrombotic disorders, Coagulation disorders

CHAPTER 3:

MODULES

MODULE 1: WRITING WINNING PROPOSAL

- Understanding and developing your proposal.
- Writing effective specific aims.
- Developing a compelling significance section.
- Demonstrating innovation and approach.
- Putting it all together and developing an engaging abstract and title

3.1 MODULE 1 WRITING WINNING PROPOSAL: Towards Building a Successful Research Career in Heamatology: Dr Marcus Chilaka,

A proposal is a sales tool not an information packet. The purpose of the proposal is to make a persuasive case that leads to a sale (James, 2014)

Session Outcome

1. To outline the components of an innovative research proposal for academic and funding purposes
2. To highlight the various hurdles to overcome in winning research grants and funding

Outlook

- Understanding and developing your proposal
- Writing effective specific objectives
- Developing a compelling significance section
- Demonstrating innovation and approach
- Putting it all together and developing an engaging abstract and title
- General Success Tips

UNDERSTANDING AND DEVELOPING YOUR PROPOSAL

The Proposal – What is it?

- A document that contains details about a scientific investigation to be carried out
- It contains details about:
  - The problem to be studied
  - How the investigation will be conducted?
  - Expected results and contribution
  - Work schedule / Time frame
  - Budget (for those seeking funds)

Why the Proposal?

- It is to show that
  - the problem you propose to investigate is significant enough to warrant the investigation,
  - the method you plan to use is suitable and feasible
  - the results are likely to prove fruitful and will make an original [or significant] contribution
  - Fit and suitable for progression and funding

Uni. of Queensland (2020)

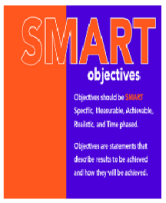
What to Include:

- Introduction
- Background to research & statement of problem
- Research Objectives
- Review of Literature
- Methodology

The Great Proposal

- A good idea or compelling project
- Research addresses a significant problem
- Clear description of the research activities
- A good fit with funding agency's priorities
- Based on scientific facts and the art of clear communication

SPECIFIC RESEARCH OBJECTIVES



- Relate to identified needs
- Relate objectives to sponsor agency's goals and priorities
- Clear and concise
- Feasible
- Should drive the research methodology

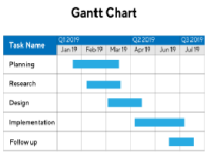
Use Action Verbs

Anticipate	Construct	Discriminate	Measure
Arrange	Contrast	Display	Motivate
Assemble	Coordinate	Distinguish	Organize
Assess	Decrease	Establish	Quantify
Build	Demonstrate	Estimate	Solve
Categorize	Describe	Evaluate	Stimulate
Classify	Design	Explain	Summarize
Compare	Detect	Illustrate	Translate
Conduct	Discover	Increase	

Compelling Significance

- What specific need or problem does your research address?
- How was the need identified and its significance?
- Who will benefit from the proposed research project?
- Linked to the research questions and/or objectives of the proposal

Mind the Timeline



- Use chart or table
- Illustrate each phase of implementation
- Show when results will be achieved

Innovative Approach (Methodology)

- Experimental design and layout
  - ensure robustness of statistical analyses
  - do not elaborate on commonly used methods
- Equipment and software needed
- Site location and its general characteristics
- Statistical methods for data analysis
- Analysis should meet project objectives

Engaging Abstract and Title

- One-page abstract
- State problem
- Propose solution
- State project objectives and significance
- Good titles identify the field(s) of research and indicate the kind of results to be obtained
- Avoid too long titles and general or vague titles.

Success Tips

- Research the funder and the review process
- Always write for reviewer
- Communicate well
- Read directions and follow them obsessively
- Understand that a proposal is an instrument of persuasion

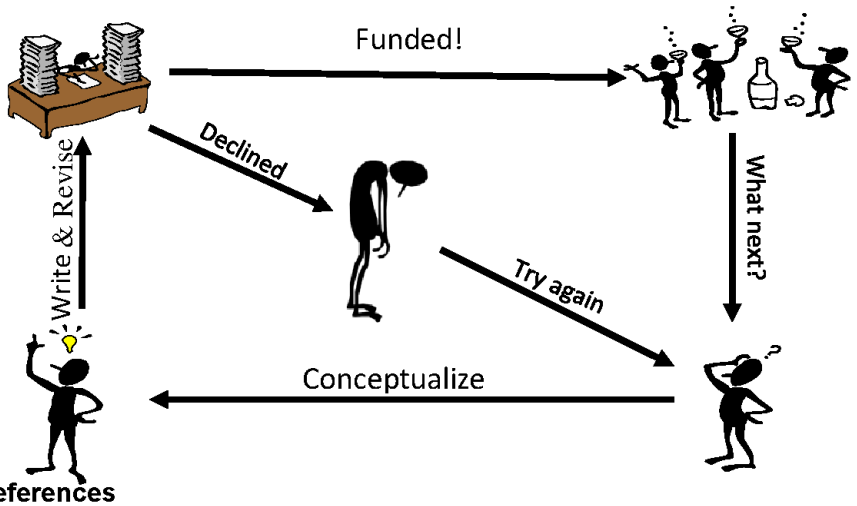
Cost Effective Budget

- Make sure budget coincides with narrative
- Make sure sponsor will support budget categories you propose
- Be realistic about your budget
- Inflating budget may hurt your chances of being funded
- Budgeting too low may make the project impossible to do with funds provided
- Estimate costs as accurately as possible

Common Mistakes

- Don't follow directions (font, margins, pages, appended material, etc.)
- Format
- Not allowing enough time
- Careless criticism of other scholars in field
- Writing unclear - too much jargon, not accessible, or not well organized; spellings and grammar
- Methods and work plan unclear or undefended
- Lack of specificity

The Proposal Cycle *(Smith, 2018)*



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MODULE 2 EXPERIMENTAL DESIGN AND STATISTICS

- Understand quantitative research design.
- Recognize and link basic concepts of statistics with “what it means” and “when it is used”.
- Determine and implement the appropriate statistical analysis needed to answer your research question based on the type of data collected.

3.2 APPPROPRIATE USE OF INFERENTIAL STATISTICS IN BIOMEDICAL RESEARCH CYCLE by Professor Teddy Charles Adias, Federal University Otuoke, Bayelsa State, Nigeria.

INTRODUCTION

The primary aim of research conducted in biomedical fields are to achieve reasonable understanding of biomedical processes - both in health and in disease - in order to make significant advances in treatment of disorders in man, through the development of more sensitive and specific models for prevention, detection or treatment. Overall, biomedical research has a bearing either directly or indirectly on health outcomes.

In academics, research remains a strong arm of the tripodal mandate of the setting of tertiary institutions - teaching, research and community service. Research is a fulcrum for academic mentoring and advancement. Scientific publication as a product of research is a peer-review process that result in cross-sectoral interaction for effective knowledge dissemination. Research project undertaken by students at various levels remain a mandatory requirement (the rite of passage) for graduation.

In all scenarios, biomedical research requires that data be collected, analyzed, presented, and inferences made. Biomedical researchers sometimes find the application of appropriate inferential tools to their results very daunting hence the need for this article. In the evolving themes, I hope to present elemental scopes on the nature of biomedical research cycle and amplify critical steps on choice of appropriate inferential statistical on data analysis.

THE BIOMEDICAL RESEARCH CYCLE

The biomedical research cycle could be seen to be made up of fourteen sequential phases as shown in Figure 1:

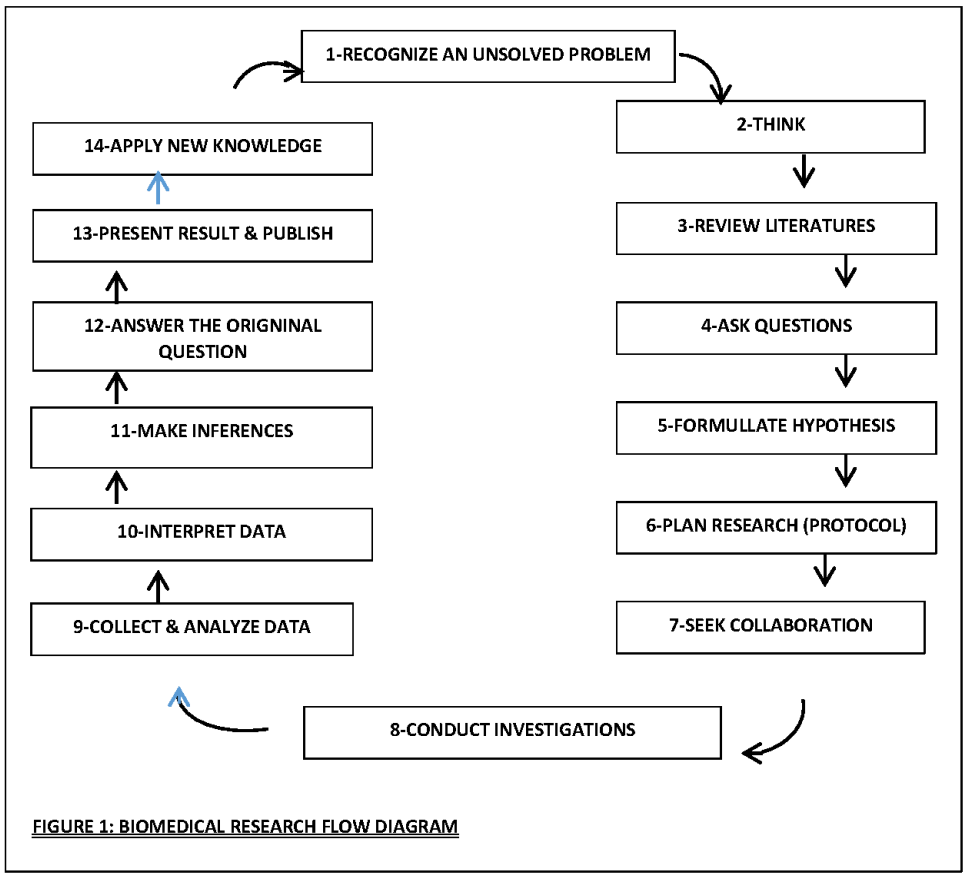

FIGURE 1: BIOMEDICAL RESEARCH FLOW DIAGRAM

1: Recognize an unsolved problem: In order to conduct a study, it is necessary to identify an unanswered question from previous work or others works or from current problem in the society. This forms the index of the research cycle.

2: Think: For an effective research conduct, the investigator must think deeply; contemplate, and speculate about an unsolved problem requiring additional empirical insight. The current COVID-19 onslaught opens a door for biomedical research work-ups.

3: Review of Literatures: In starting a biomedical research, the researcher must review the scientific background against which his work will stand. In biomedical research, as in other forms of research, there have been many examples of "rediscovering the round wheel" which could have been avoided had the investigator been aware of the historical background of the subject. Churchill and others have expressed the thought that those who did not read history are doomed to repeat the errors (and one might add, the experiments) [1,4]. Reviewing literatures had become easier with the availability of several open access repositories. This offers limitless opportunities for researchers to ride on several shoulders.

4: Ask Questions: The review of literature provides insight to the historical background of the problem. This should enable the researcher to ask intelligent questions. In relation to a specific phenomenon under investigation the question frequently begins with why? how? what? or which? Much time, effort and money will be wasted if an inappropriate question forms the underlying basis for a research project for as the scientist Sir Henry Tizard has emphasized "The secret of success in science is to ask the right question".

5: Formulate Hypothesis: Formulating a research hypothesis literally offers a subordinate thesis or a theoretical and provisional supposition which serves as a starting point for further investigation by which it may be proved or disproved. The working hypothesis is a carefully reasoned but as yet unproven answer to the question, and should lend itself to the testing of its validity through the research project that is being planned. Although, research hypothesis is usually stated either in the null or alternative forms however, it is the null hypothesis that is usually tested.

6: Plan Research: This step entails the strategic planning of the research protocol. The final result of this phase is the production of the protocol document that should clearly defined background information, to include (but not exhaustive) the Aim and Objectives, Research Questions and Hypotheses, Study Design and Sampling, Sample Size Determination and Power Calculations, Consents and Ethics, Laboratory Procedures, Data Analysis and Statistical Significance.

7: Seek Collaboration: As biomedical research becomes increasingly complex and sophisticated, we must be prepared to collaborate with scientists of other disciplines-such as physiology, biochemistry, biophysics and biomedical, engineering - in multidisciplinary research. Through such collaborative research cross-fertilization of idea enriching scientific thinking and the scientific investigation grows in both depth and breadth. It was the importance of collaboration in research that Claude Bernard was extolling when he wrote: "Art is I; Science is We".

8: Conduct Investigation: In the conduct of structured investigation, we set out neither to prove nor to disprove our hypothesis but rather to test its validity with complete objectivity. In carrying out this process, ethical principles of conduct are required in obtaining legal consent from human subjects. Experimentation with animals must also meet the minimum requirement in accordance with declarations in these regards.

9: Collect and Analyze Data: The domain of collection and analysis of data lie within the study of statistics. The rules governing the appropriate use of statistics (descriptive or inferential) are evolving concepts. Therefore, for ease of understanding in the context of this paper, it is necessary to defer these details for an appropriate subhead. However, it is ought to be stated that as we make observations and collect data during your investigation,

you must be watchful of unexpected finding of significance (serendipity). This occurrence should stimulate new frontier for further or new research. Overall, a well-structured and planned protocol make data analyse seamless; and determining statistical significance, untroubled-free.

10: Interpret Data: In the interpretation of the data you must consider all of the data and not just those parts that seem "to fit" your hypothesis because through the latter process you would, in fact, be deluding yourself-and others; you would be making the facts fit the theory rather than, as you should be, making the theory fit the facts. It may have been this type of intellectual dishonesty that George Bernard Shaw was contemplating when he wrote "Beware of false knowledge -it is more dangerous than ignorance"[4].

11: Make Inferences: Through the application of sound logic and scientific reasoning you should draw valid conclusions-insofar as that is possible-on the basis of the factual data. This is another difficult phase of the cycle of medical research since the clinician-scientist may be tempted, subconsciously and unwittingly, to draw conclusions that are not justified by the factual data. When more than one interpretation of the data seems reasonable, it may be necessary to initiate another cycle of research to clarify the matter.

12: Answer the Original Questions: By the time you have reached this phase of the cycle you may well be able to answer the original question. You should not be disturbed if the answer is not that which you expected because, of course, you are seeking the truth rather than proof of a preconceived theoretical answer to the original question. The search for truth, however, is never-ending because the more questions you answer the more questions you will raise to take their place. Each of these questions, in turn, will serve as the catalyst for the creation of another research cycle[4].

13: Present Result and Publish Paper: Having completed the investigation it is important for you to present the results at a scientific meeting in order that you may benefit from the resultant discussion-both positive and negative. Indeed, constructive criticism of a given scientific investigation can only help you to improve upon its final presentation. It would be considered unprofessional for you as a biomedical scientist to share the results of your research with the general public through the lay media-press, radio or television-before these results have been either presented at a major scientific meeting or published in the scientific literature. If your investigation has been worth doing it is worth publishing and you should seek publication in a reputable scientific journal which is critically refereed. You have moral obligation to publish a significant scientific break-through[4].

14: Apply New Knowledge: As implied in the adjective "applied", this type of mission-oriented or targeted research frequently leads to new knowledge that can be applied to the unsolved clinical problem that initiated the cycle of medical research. The application may be relevant to an improved understanding of the aetiology, pathology, pathogenesis, detection, treatment, or even prevention of the clinical problem under investigation. Thus, the cycle of biomedical research is complete and you would have progressed from realistic research to biomedical reality, which will serve as the catalyst for the creation of another research cycle[4].

NATURE OF INFERENTIAL STATISTICS

Statistics can be classified loosely as descriptive and inferential. Descriptive statistics deal with summaries statistics of sample data, whereas inferential statistics make generation of population characteristics from sample data. The fundamental question is: can we infer the population's characteristics from the sample's characteristics? Yes, Population characteristics can be inferred from sample characteristics - this is the beauty of inferential statistics. The domain of descriptive statistics remains local to the sample data, describing summary measures of central tendency and variability, while inferential statistics focuses on making statements about the population[4].

Inferential statistics is further divided into parametric and non-parametric. Parametric tests are more robust and requires less data to make a stronger conclusion than nonparametric tests. However, to use a parametric test, three parameters of the data must be true or are assumed:

1) Data need to be normally distributed, which means all data points must follow a bell-shaped curve without any data skewed above or below the mean.
2) Data also need to have equal variance and have the same standard deviation.
3) Data need to be continuous.

Non parametric test however requires no assumption however, require more data require more data for effective inference to be made.

Most commonly used parametric test used in biomedical research include: Pearson product moment correlation coefficient; Student t-Test; z-Test; Analysis of variance. Conversely, commonly used non-parametric test are Chi Square; Spearman Rank correlation coefficient; Mann-Whitney U test; Kruskal-Wallis test.

PARAMETRIC AND NON-PARAMETRIC EQUIVALENT

There is at least one nonparametric test equivalent to a parametric test. These tests fall into several categories:

1) Tests of differences between groups (independent samples)
2) Tests of differences between variables (dependent samples)
3) Tests of relationships between variables

Tests of differences between groups (independent samples):

The Table below depict parametric and non-parametric equivalent in comparing mean of two independent observations.

PARAMETRIC	NON-PARAMETRIC
t-Test for independent samples	Mann-Whitney U test
	Kolmogorov-Smirnov two sample test

The Table below depict parametric and non-parametric equivalent in multiple comparison of independent observations.

PARAMETRIC	NON-PARAMETRIC
ANOVA/MANOVA	Kruskal-Wallis
	Median test

The Table below depict parametric and non-parametric equivalent comparing two dependent variables for groups measured in the same sample.

PARAMETRIC	NON-PARAMETRIC
t-Test for dependent samples	Sign test
	Wilcoxon's matched pair test

The Table below depict parametric and non-parametric equivalent comparing more than two dependent variables for groups measured in the same sample.

PARAMETRIC	NON-PARAMETRIC
Repeated measures ANOVA	Friedman's two-way analysis of variance

The Table below depict parametric and non-parametric equivalent comparing relationship between two categorical variables.

PARAMETRIC	NON-PARAMETRIC
Pearson product moment correlation coefficient	Spearman rank correlation coefficient
	Chi square, Fisher Exact, Coefficient gamma, Kendall coefficient of concordance, Phi coefficient

RELATIONSHIP BETWEEN CLASS OF DATA AND DECISION RULES

An understanding of the nature of statistical data (which are either qualitative or quantitative) is important in determining the form of inferential statistic to employ for any kind of data derived from biomedical research. I have provided an easy decision tree guide (Figure 2).

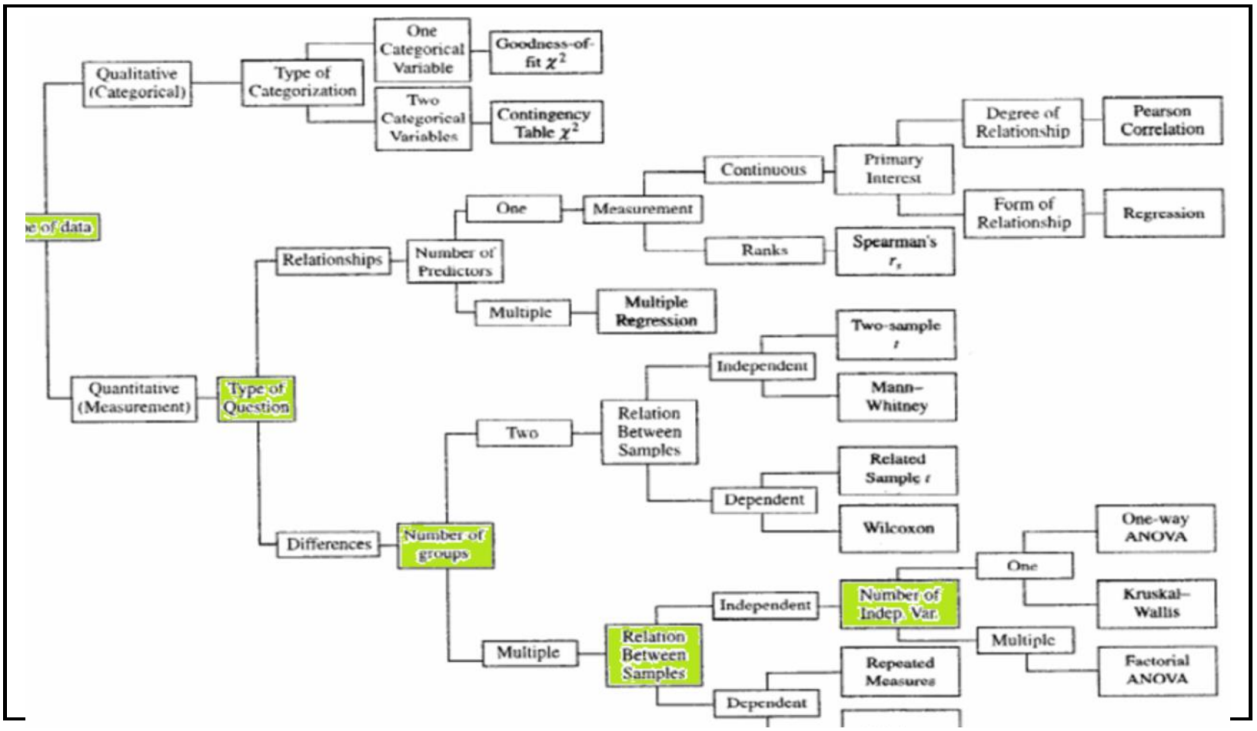

FIGURE 2: DECISION RULE ON APPROPRIATE USE OF INFERENTIAL STATISTICS

REPORTING AND INTERPRETING ERROR PROBABILITY VALUES

Inferential statistics uses data from a sample to demonstrate the likelihood that a hypothesis about a population is true. There are always two mutually exclusive hypotheses (Null and Alternative). If the hypothesis being tested (Null hypothesis), then the opposite (Alternative hypothesis) is true. A measure for the evidence for or against these hypotheses is called the **Error probability (*P value*)**.

The P value is the probability, given that the null hypothesis is true, of obtaining data as extreme or more extreme than that observed. 5% is commonly used as a cut-off, such that if the observed P is less than this ($P<0.05$) we consider that there is good evidence that the null hypothesis is not true. This is directly related to the Type 1 error rate. If 5% is the cut-off then $P<0.05$ is commonly described as statistically significant and $P\geq0.05$ is described as not statistically significant.

It is best to always report the exact P value from a test rather than report findings as $P<0.05$ or $P\geq0.05$) or worse still P=NS (not significant). The evidence provided when P values are exactly stated, enable effective understanding of the probability function and ensure proper interpretation[3].

In biomedical research, it ought to be stated that having a non-significant finding might not necessary mean that this finding has no biomedical significance. Finding of biomedical importance but not statistically significant is a pointer for further studies, as this may constitute rare events.

CONCLUSION

Research is the bedrock of biomedical science with rules of engagement built on firm principles of evidence and replicability among others. Inferential statistics and indeed statistics enable us to summarize our observation and further guide us to make significant deductions.

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MODULE 3: RESEARCH SUPERVISION AND INTEGRITY

- Researchers' responsibilities
- Supervising undergraduate and postgraduate students
- Successful models of supervision
- Empowering candidates to manage the supervisor-student relationship
- Supporting your students to get published
- Warning signs that things aren't going well and how to respond

3.3 MODULE 3 RESEARCH SUPERVISION AND INTEGRITY: - Prof. (Mrs.) Evarista Osime AT THE MAIDEN CONGRESS OF HAEMATOLOGY AND BLOOD TRANSFUSION SCIENTISTS SOCIETY OF NIGERIA, MARCH, 2020

OUTLINE OF PRESENTATION

i. What is Research
ii. Who carries out a Research
iii. Characteristics of a good Researcher
iv. Characteristics of a Research
v. Role of a Supervisor
vi. Responsibilities of the Researcher
vii. Undergraduate and Postgraduate Supervision
viii. Successful models of supervision
ix. Empowering candidates to manage the Supervisor-Student relationship
x. Supporting the student to get into Publishing
xi. Warning Signs that things aren't well and how to Respond
xii. Conclusion

WHAT IS RESEARCH?

This can be defined as a systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions. It is a detailed work into finding out exact mechanisms for or unto different outcomes and results.
Other words for research are:
-investigation
-experimentation
-fact finding
-examination
-scrutiny
-probing, etc.

WHO CARRIES OUT A RESEARCH

A research is carried out by humans and the individual(s) or scientist(s) conducting the experiment are normally called observers.

CHARACTERISTICS OF A GOOD RESAERCHER

-Must be able to read, read and read
-Must cultivate a thinking and reasoning spirit
-Must be patient
-Must create time
-Must be ready to accept scrutiny, corrections
-Must be creative
-Must be inquisitive
Must be ready to sacrifice/use his or her finances

CHARACTERISTICS OF A RESEARCH

-It is systematic. There is no such thing as a perfect research
-It is cyclical. It ends up back where it started-with question
-It is replicable, planned, orderly
-It starts with a question
-It is reflexive and self-critical

ROLE OF A SUPERVISOR

- The general role of supervisors is to guide and assist students during their period of registered study. The roles of supervisor is quite distinct and it is not the role of the supervisor to assess the thesis.

- Supervisors should ensure that they undertake training as part of their continuing professional development. They should take the initiative in updating their knowledge and skills by participating in a range of appropriate activities and sharing good practice.

- Documentation check: At the onset the supervisor should ensure that the student has registered fully in the department and all relevant documents should have been provided by the student. Also they should ensure that the student has all the materials provided by the institution such as school handbook and any relevant safety device.

- Research plan: Supervisors should assist their students to plan their research study, including helping student to define their research topic, to identify schemes and specific tasks, to identify the relevant research literature, data bases and other relevant sources.

- Advising on regulations: They should have a reasonable knowledge and understanding of the University's regulations governing research study and the University, Faculty and Departmental procedures governing research study and supervision. They are required to advise their research students on these regulations and procedures.

RESPONSIBILITIES OF THE RESEACHER

- The main aim of a researcher is to advance knowledge.
- They have the responsibility to develop the capacity for independent, honest and critical thought.
- They have the responsibility to communicate their research, to partner with others where necessary and appropriate and to transfer the correct knowledge for the benefit of an employer, the economy and society as a whole.
- Researchers have responsibility to behave honestly and ethically in the course of their research.
- The ultimate responsibility for the personal and professional development of researchers lies with the individual researcher.
- It is worthy of note that Institutions are expected to support research staff in their career development, you are responsible for planning your career and identifying the training and experience that you will need to help you get to where you want to be.
- -You have the responsibility to communicate your aspirations. Your colleagues, line manager and your mentor can help you only if you are willing to talk about your career ambitions.

UNDERGRADUATE AND POSTGRADUATE SUPERVISION

- The supervision of undergraduate and postgraduate students are basically the same. The only difference is that at each level there should be a progressive maturity in each of the studied areas.
- Students conducting research are expected to apply the highest standards of ethical conduct in the development of projects, the collection and analysis of data and the reporting of results.
- They have the primary responsibility for the direction and progress of their research and for the delivery of a thesis of an appropriate standard within the relevant maximum registration period.
- The research student is expected to adopt a professional approach to the research degree programme including:
    - Good time keeping
    - Observing deadlines
    - Reading and responding to communications from the supervisor and other members of the University.
    - Taking responsibility for their own skills and career development.
    - Making themselves familiar with relevant policies and procedures.
    - Developing an appropriate research plan that will enable submission of the thesis for examination within the relevant maximum registration period.
    - Managing and sustaining progress in accordance with the agreed research plan.
    - Recognizing when they need help and taking the initiative in raising any concerns and problems as early as possible with the supervisor.
    - Complying with all relevant requirements with respect to intellectual property.
    - Making time at the start of the research degree programme to discuss the nature of research, the standard of work expected and the respective roles and responsibilities of the student and supervisor.
    - Maintaining regular contact with the supervisor and taking the initiative in agreeing with the supervisor's comment.
    - Reflecting on and responding to feedback and guidance provided by the supervisor.
    - Preparing and keeping an agreed written record.
    - Complying with the University's requirements for formal progress reviews.
    - Undertaking appropriate skills and career development training.

- Maintaining a record of completed skills and career development activities and reviewing/revising their training plan as appropriate.
- Providing the supervisor, a complete final draft in sufficient time before the required submission date for the supervisors to read and comment on'
- Reflecting on and responding to feedback and guidance provided with regards to the final draft of the thesis.
- Ensuring that the thesis complies with all relevant regulations.
- Making appropriate preparations for the viva examination.
- Complying with all thesis final submission requirements.

SUCCESSFUL MODELS OF SUPERVISION

In this we talk about the way and manner of approach of supervisors towards their supervisee. It should be noted that no two supervisors are the same and so less comparison should be made on them by the supervisee and accepted thus. But in all the relationship should be cordial, friendly and relaxing but not to the point that the student gets too friendly to their supervisors. There are three primary models of supervision, they are:

- Developmental models
- Integrated models
- Orientational-specific models

DEVELOPMENTAL MODELS

The underlying premise of developmental models of supervision is the notion that individuals are continuously growing.

Studies revealed that behavior of supervisors changed as supervisees gained experience and the supervisory relationship also changed. In general, the developmental models of supervision define progressive stages of supervisee development from beginner to expert, with each stage consisting of discrete characteristics and skills.

- In the process of becoming competent, they will progress through a number of stages that are qualitatively different from each other.
- The beginner supervisee would tend to function in a rigid, shallow, imitative way and then overtime move toward more competence, self-assurance and self-reliance.
- When supervisors relate as colleagues during supervision they might act in a consultancy role. This model also emphasizes the care supervisors must take towards an unethical reliance on dual relationships.

INTEGRATED MODEL

- This provides a tangible structure for the supervisor to use in selecting a focus for supervision and in determining the most effective way to deliver particular supervision interventions'
- The supervisors might take on the role of "teacher" when they directly lecture, instruct and inform the supervisee. They might then act as counsellors when assisting supervisees through blind spots

ORIENTATION SPECIFIC MODELS

This deals with the fact that effective supervision should be therapy based and theoretically consistent. In this model it is believed that supervisee and supervisor share the same theoretical orientation, thus allowing modelling to be maximal as the supervisor teaches the supervisee on the specific theory and how it is integrated in to the practice skills specifically.

It is worthy of note that issues can arise between the supervisor and supervisee in the context of an orientation specific approach to supervision particularly if they do not share the same theoretical orientation.

EMPOWERING CANDIDATES TO MANAGE THE SUPERVISOR STUDENT RELATIONSHIP

A supervisor and student are responsible for building an environment of mutual trust and respect, the supervisor should take the lead to do so because of the power imbalance.

- As a supervisor, try to develop a relationship with your supervisee based on clear expectations and mutual respect from your first meeting onward.
- Addressing problems
- Attending to cultural differences

- Finding motivation to supervise

In time past, the supervisor/supervisee relationship was more or less dictorial but now with advance in technology the narrative is changing. Although the seed of a research topic may come from the supervisor. He/she introduces the idea to the student and provides all the necessary means for growth. It is the student who takes the shovel to nurture the seed with soil, water it and monitor its growth. The supervisor must also watch that everything goes well so the tree can grow. If problems arise the supervisor must provide solutions and the means to reach them, advised or helped by the student of course who cares directly for the tree and probably knows it better. But the main responsibility to find solutions belongs to the supervisor.

These ingredients can be summarized thus:
- A relationship between equals.
- Inspiration and creation of ideas
- Means
- Progress of the work
- Co operation
- Encouragement
- Discrepancies management
- Knowledge transfer
- Professional projection
- Relationship forever

SUPPORTING THE STUDENT TO GET INTO PUBLISHING
- Allow your students to see themselves as authors.
- Read a lot of narratives
- Make available to them relevant writing assignments that are applicable to their research work.
- Allow them permission to make mistakes.
- Give them the opportunity to publish and share their own writing.

WARNING SIGNS THAT THINGS AREN'T GOING WELL AND HOW TO RESPOND
- When the supervisor has a change of tune.
- Your responsibilities have shifted in a major way.
- One keeps hearing the same negative feedback.
- Encountering challenges every step on the way.

CONCLUSION
Research supervision and integrity is an act, a flow of knowledge from the duo. Effective supervision should be selfless not necessarily having in mind to be rewarded financially but with the sole aim of imparting and making a better progress in the life of somebody and helping someone to climb a ladder to reach the zenith of one's career.

THANK YOU ALL FOR LISTENING.

MODULE 4 RESEARCH PROJECT MANAGEMENT

Sub-Topics:

- Understand how to implement and control a project
- Understand the relationship between priority of constraints and success criteria
- Know how to create a realistic project plan
- Understand how to minimize risk to a project
- Understand how to manage change to a research project
- Understand how to close a project

3.4 MODULE 4 RESEARCH PROJECT MANAGEMENT

UNDERSTAND HOW TO IMPLEMENT AND CONTROL A PROJECT: - Abiodun Olaiya Paul PhD, FWAPCMLS

- **Understand How to Implement and Control a Project.**
- **Understand the Relationship between Priority of Constraints and Success Criteria.**
- **Know How to Create a Realistic Project Plan.**

Project Management
A project is a unique venture with a beginning and an end, conducted by people to meet established goals within parameters of cost, schedule and quality. A project always has certain goals, a clear time frame and budget. It is unique and separate from normal organization work, "it takes place outside the process world".

A **project** is a sequence of tasks with a beginning and an end that are bounded by time, resources, and desired results.
This means that a project has
- a specific, desired **outcome;**
- a **deadline or target date** when the project must be done;
- and a **budget that limits the amount** of people, supplies, and money that can be used to complete the project
  There are at least six characteristic features that define every project and make it different from most ordinary work:
- A project has a defined beginning and an end. Getting from the beginning to the end of a project typically involves a definable sequence of steps or activities.
- Projects use **resources** (time, people, money) that have been specifically allocated to the work of the project.
- The end results of a project have **specific goals of quality and performance**.
- Projects follow a **planned, organized approach** to meet their objectives.
- A project usually involves a **team of people** to get it done.
- Every project is **unique**. This does not mean that certain activities have to be unique, but rather because of their different contexts and their particular use of resources, time, and results.

Non-governmental such as HBTSSN projects may be narrowed down even more:
- Projects are functional and sociopolitical plans, that are limited by time and space and are supposed to have an effect within this framework.
- In the third world aid policy, a project is defined as a timely limited process of bringing results.
- Projects are usually complex and are a composure of many single measures that are related to each other. Many are seen as an innovative experiment to solve problems as a model case.
- Projects in field of aid to developing countries usually need the cooperation between different specialists from different fields.
- Projects do have a project leader or project manager.
- Sponsorship is restricted to a rather short time period. In the field of aid to developing countries this time varies between months and years, in the NGO-work, it may be sponsored for a follow-up time of up to ten years.
- The area of project work is various. There are simple visiting projects, the promotion of single specialist home or abroad in the organization up to very complex sociopolitical projects that afford a very high funds.
- A broadened expression of project is programme. A program is defined a more than one project, that are connected regional or sectoral and do have a common concept.
- Programs and projects are the central elements of developing strategies to reach defined goals. Thus, they are the powerful instruments to organize resources for international aid agencies, ministries, and welfare organizations.

Definition of Project Management:
Why Project Management? What is a project (definition)? A project is a unique venture with a beginning and an end, conducted by people to meet established goals within parameters of cost, schedule and quality. A project always has certain goals, a clear time frame and budget. It is unique and separate from normal organization work, 'it takes place outside the process world'.

Elements of Project Management:

- Complex, one-time process;
- Limited by budget, schedule and resources;
- Developed to resolve a clear goal or set of goals;
- Focused on affected group of people.

General Project Management Characteristics:

- Ad-hoc endeavors with a clear life cycle;
- Building blocks in the design and execution of organizational strategies;
- Responsible for the new and improved products, services and organizational processes;
- Provide a philosophy and strategy for the management of change;
- Entail crossing functional and organisation boundaries;
- Traditional management functions of planning, organizing, motivating, directing and controlling apply;
- Principal outcomes are the satisfaction of stakeholder requirements within technical, cost and schedule constraints;
- Project ends when its objectives are successfully reached.

What are Project Processes?

Takes place outside the process world. Unique and separate from normal organization work. Ongoing, day-to-day activities. Use existing systems, properties and capabilities.

- Project life cycle, success factors

4 Major Stages in Project Management Life Cycle:

1. **Conceptualization**: Outlines project goal, scope of work, identifies required resources and stakeholders.
2. **Planning:** Specifications, timetables and work packages are broken out, assignments are made and process for completion is defined.
3. **Execution**: The actual work is done here, majority teamwork, also the majority of costs included here.
4. **Termination:** project completed and passed on to customer, resources are reassigned and team members disbanded.

Project Life Cycles and their Effects

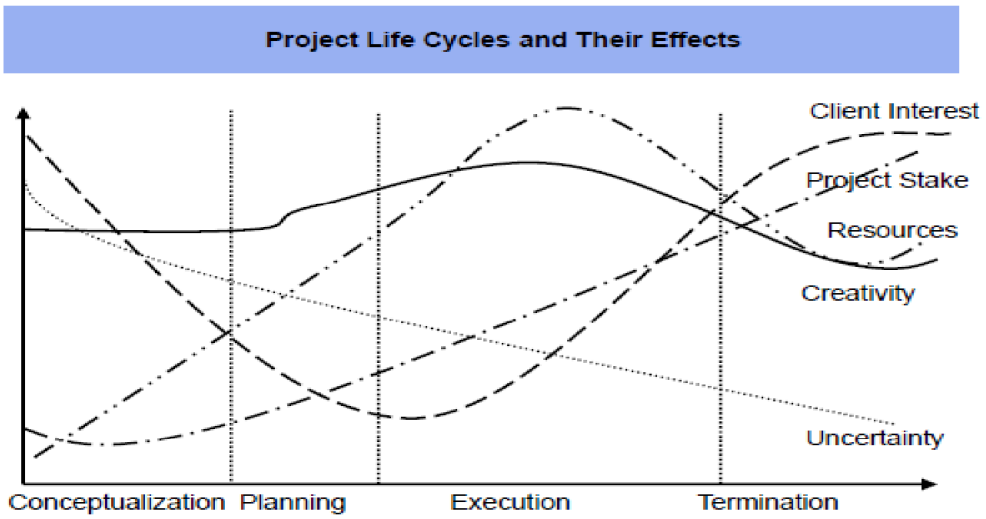

Figure 1: Figure 1: Project Life Cycles and Their Effects

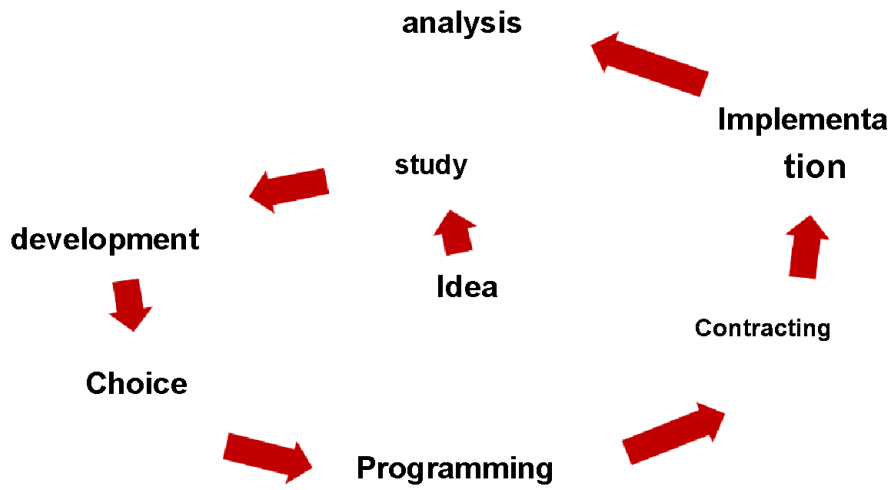

Figure 2: Project Idea

Project Success:
Project success is mainly determined by 4 factors: Budget, schedule, performance and acceptance. Acceptance is the long-run goal in order to make the project's effects sustainable. Goals most likely to be conflicting are budget and schedule as well as budget and performance.

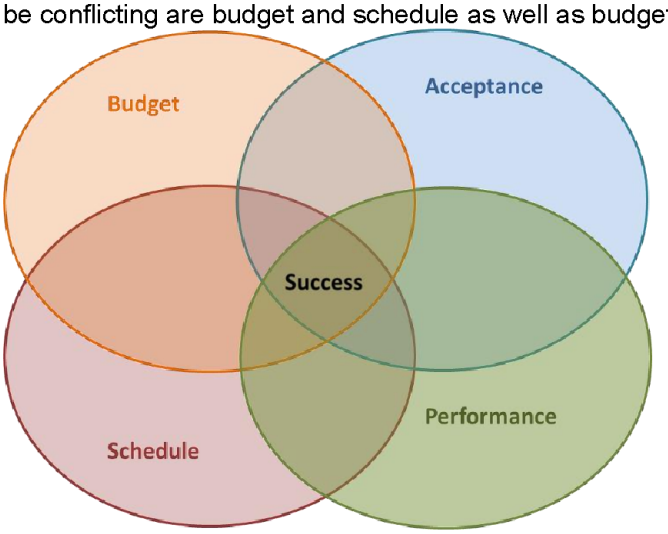

Figure 3: Factors that determined Project Success

Conditions for Project Success:

1. Organizational structure complies with the features of the project team.
2. The team is involved in planning.
3. The team determines the schedule of the project implementation.
4. The team adopts a realistic budget.
5. The project effectively uses the planning methodology which prevents the project from turning into an end in itself.
6. The project team collaborates with all stakeholders, rather than working against them. All procedures are respected.
7. Within the team, there is an agreement what presents concrete and realistic goals.
8. Project beneficiaries are initially involved in the project implementation.

Reasons for Project Failure

1. Insufficient authority of the project manager.
2. Weak involvement of the project team members in the initial planning of the project.
3. Lack of participation of the project team in problem solving.
4. Inadequate communication skills.
5. Inadequate technical skills.
6. Inadequate administrative skills.

7. Unrealistic project timeline.
8. Unclear project goals

Project Plan Gant Bar Chart and Workplan

A bar chart, sometimes also called project timeline, shows all tasks in relation with time. With some limitations, the interdependent relationship between tasks can also be implemented.

Bar charts are used frequently and is the preferred method on many projects, because they are easy to set up, read and understand. The charts are often assembled on wall-mounted boards, using proprietary kits using strips of material which can be moved about to adjust the schedule as required. Nowadays more and more computer programs are used to generate and update the bar chart.

Bar charts are drawn or constructed on a **scale** where the **horizontal axis is directly proportional to time**. It could be calendar weeks, months or years for more complex projects, days or hours for very short projects.

Each horizontal bar represents a task, its length scaled according to its expected duration. The name or description of each job is written on the same row, at the left hand side of the chart. To indicate the constraints between tasks, vertical lines can be added to the chart. They indicate that one task has to be finished before the following one can possibly begin.

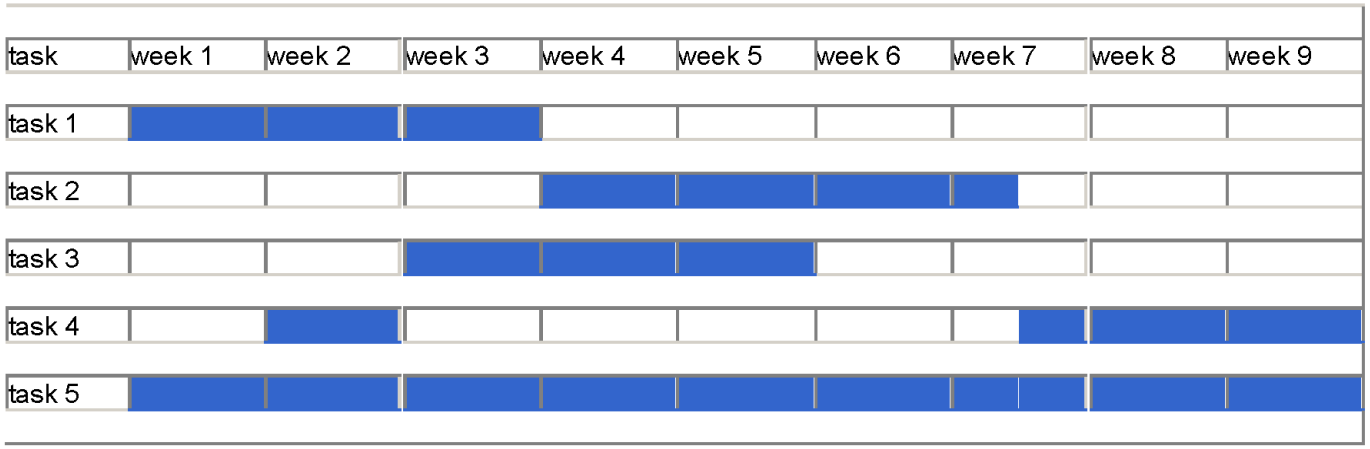

Figure 4: Example for a Gantt Bar Chart.

Although it is possible to schedule more than a hundred tasks on an adjustable bar chart, rescheduling is a different story. Setting up a complex plan in the first place might take a few working days or a week, adjusting it subsequently to keep in step with changes might prove impossible.

Bar charts are suitable only for relatively small projects because the links might become too difficult to draw and follow when there are too many tasks.

Resource Planning
After the tasks have been defined and a basic network established, a complete list of resources required for your project can be developed. You are in the position to say what and who you need, and when. The goal of resource planning is to schedule all necessary resources on time.

In a first step, **determine the need of resources for each task**. Every task has a certain need for resources, people, money, equipment, information, technology etc. To keep it simple we are looking at people per weeks. The picture below shows an example.

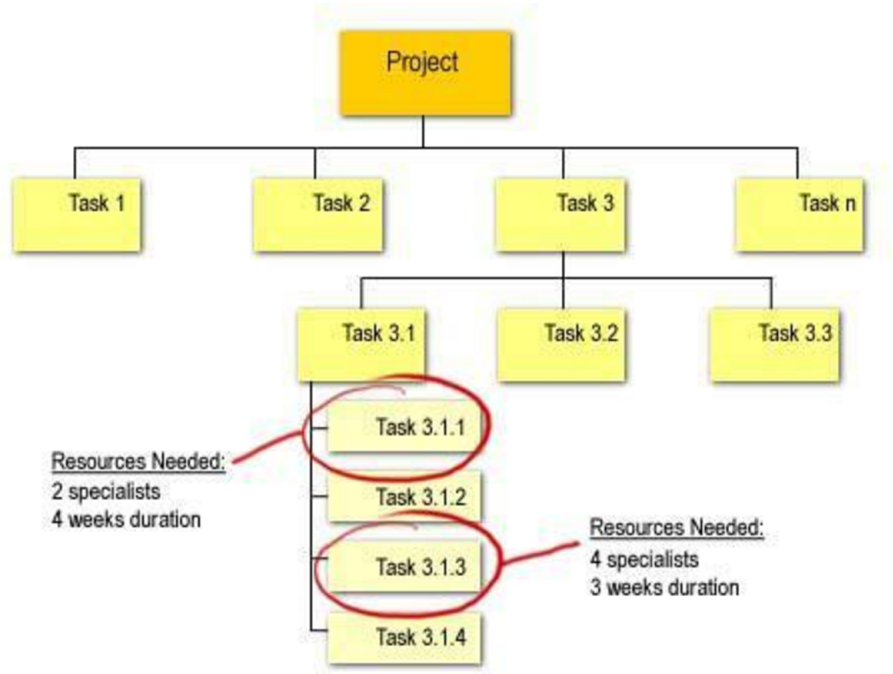

Figure 5: Task and Project

In a following step, **write all the needs in a table**, similar to a Gantt Chart. If task 3 starts in week 4 and lasts 3 weeks, **list all people you need per week in the chart**.

THEME: REACH OUT WITH VMLS CORPS TO MY COMMUNITY								
VMLS CORPS WORKPLAN FOR 2019								
Activity	Responsible Person(s)	19-Feb-19	26-Feb-19	1-Mar-19	5-Mar-19	12-Mar-19	19-Mar-19	26-Mar-19
Board of Trustee-Country Level Activity for FY19-	BOT	Week 4	Week 5	Week 1	Week 2	Week 3	Week 4	Week 5
Regroup, Reshuffle and Restrategise VMLS	Porject Director, Excos and BOT							
Set up State Structures,	Porject Director, Excos and BOT							
Define departments,programmesand activities	Porject Director, Excos and BOT							
Incorporation and inaugurations	Porject Director, Excos and BOT							
World Cancer Day Celebration	Porject Director, Excos and BOT							
Training Weekend	Trainers/Consultants							
VMLS Media Campaigns	Porject Director, Excos and BOT							
World Health Day	Volunteers MLS							
Online Outreaches	VMLS corps							

Figure 6: Sample of Work plan

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
task 1		2	2	2	2																		
task 2				3	3	3	3																
task 3																4	4	4	4				
task 4	1	1																					
task 5								4	4	4	4	4	4	4									
task 6							2	2	2	2													
task 7													1	1	1	1	1						
task 8																							
task 9			1	1	1	1	1																
task 10					3	3	3	3	3	3	3	3											
task 11															2	2	2	2	2	2	2	2	2
task 12										2	2	2											
sum	1	3	3	6	9	7	9	9	9	11	9	9	5	5	3	7	7	6	6	2	2	2	2

Figure 7: Sample of Ghant Chart

By **summing up the people you need** for a certain time (e.g., a week) you can find out how many resources you need per week and whether or not you need more resources than you have.

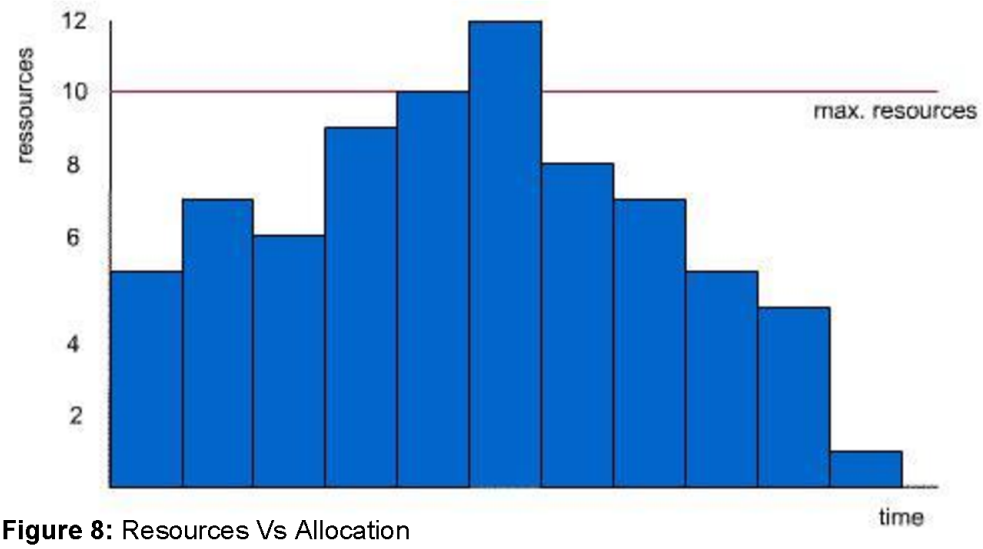

Figure 8: Resources Vs Allocation

If your plan shows an **over-allocation** you have to consider whether you want to hire external resources or if you can re-design your plan to fit. You can **use the floats you calculated in the network diagram** to move a task to a time when less resources are used and therefor

If the allocation is **very high**, it won't work just to re-allocate the resources.

Project Management Leadership
A manager is not automatically a leader! Managers have official titles in an organization but real leaders focus on interpersonal relationships rather than administration.

Important differences exist between the two on: Creation of purpose, network development, execution of tasks, outcomes, focus and time frame.

Effective project leaders should communicate well, be flexible, be good team players and should be skilled at various influence tactics.

Useful skills for relationship building and maintenance in a team are: Self-awareness (own strengths and weaknesses); Self-regulation (behavior); Motivation (internal, to measure progress and set challenging goals); Empathy and Social skills.

Project Managers function as Mini-CEOs and manage both 'hard' technical details and 'soft' people issues. They: Acquire project resources; Motivate and build teams; Have a vision and fight fires; and Communicate well, keep close contact to all stakeholders.

Team building/leading, communication
It is critical for a project manager to maintain strong contact with all stakeholders. Project meetings feature task oriented and group maintenance behaviors and serve to: Update all participants; Increase understanding and commitment; Make decisions; Provide visibility and Team Development Stages.

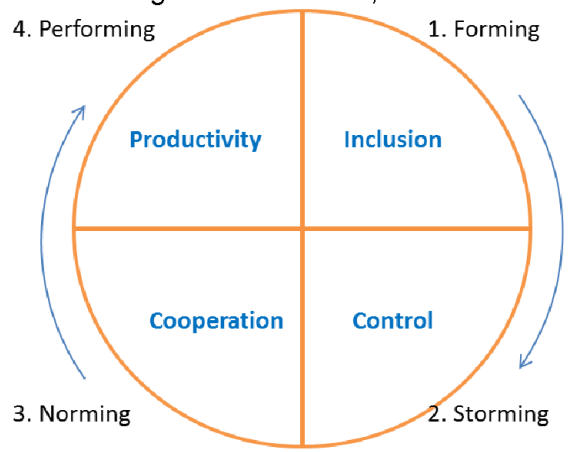

Figure 9: Team Building

When a new team is set up, 4 stages of development are run through.
First, in the Forming phase, it is all about inclusion of the team members. Everyone involved is testing the new environment, leading to a quiet and polite atmosphere. Especially when team members have not met before, interaction can be rather guarded and impersonal in the beginning of getting to know each other.
Second, the Storming phase, where team leaders will gather control and the team is confronted with first conflicts due to different personal agendas and confrontations. Aim in this stage is always to try to get control over occurring conflicts and mediate between team members.

These methods of conflict resolution can be helpful

Problem solving (confrontational)	An attempt is made to solve the actual problem.
Compromise	Get everyone involved to give a little to find common ground (not desirable if it doesn't meet anyone's needs).
Forcing	Direct order to resolves this given- worst type.
Smoothing	Focus on the positive to distract the focus from the negative.
Withdrawal	Ignoring the problem and hoping it will fix itself/disappear- not actual conflict resolution, not proactive.

Table 1: Methods of Conflict Resolution

Third, after the team has been Norming itself and got out of the conflict phase, work can be started in an organized way. Procedures can be established, team skills will be developed and disputes can be solved in an ordered manner.

The last stage, performing is the ultimate goal of team building and leading. Team members trust each other, are supportive, flexible and confident and can do their work in a highly productive and efficient way. This state can be reached when leaders do their best in communicating well with all members, solve conflicts and motivate all team members.

Further measures for building high performing teams can be:

- Make the team tangible (publicity, terminology and language).
- Reward good behavior (flexibility, creativity, pragmatism.
- Develop a personal touch (lead by example, positive feedback, accessibility and consistency).

Scope management
Project Scope is everything about a project – work content as well as expected outcomes.
Scope Management is the function of controlling a project in terms of its goals and objectives and consists of 6 steps:
1. Conceptual development.
2. Scope statement.
3. Work authorization.
4. Scope reporting.
5. Monitoring.
6. Project closeout.

1. **Conceptual Development**
   The process that addresses project objectives by finding the best ways to meet them. Key steps in information development:
   - Problem/need statement: Reduction of overall complexity, goals and objectives should be clearly stated and reference points are provided leading to a complete understanding of the problem. This is important as in the beginning the goal is not always completely clear.
   - Gather information on circumstances, constraints etc.
   - Alternative analysis.
   - Formulate concrete project objectives.

   Finished with the formulation of a statement of work (SOW), a detailed narrative description of the work required.
2. **Scope statement**
   A clear statement that establishes the project goal criteria (cost, schedule, performance, deliverables, review dates). Development of three structures essential:
   - Develop a management plan for the project.
   - Establish a work breakdown structure (WBS).
   - **Work packages are at the lowest level in WBS.** They always have a certain deliverable result, one owner and are trackable, like miniature projects themselves.
3. **Work authorization**
   This is the formal 'go ahead' to begin work. All involved group members know what to do and start to be productive.
4. **Scope reporting**
   Determines what types of information have to be reported, to whom, who receives copies as well as when and how information is acquired and disseminated.
5. **Monitoring**
   Collecting data that documents project progress. Can be done regularly (e.g. yearly or half-yearly) or ongoing.
   First, criteria have to be developed that will be measured during implementation. They should be:
   S *specific* well defined;
   M *measurable* know if goal is obtainable, how far it is to completion;
   A *achievable* goal can be achieved within agreed timeframe;
   R *relevant* doing the right things;
   T *time-based* enough time to achieve the goal.
6. **Project closeout**
   The project is not finished after everything is implemented. Closeout work is essential for documenting and communicating success.
   Closeout documentation is used to resolve disputes, train project managers or facilitate auditing. It includes historical records, post project analysis and financial closeout.

Risk Management (Identification, Analysis, Mitigation, Control)
The identification and analyze of risks throughout the lifecycle of a project as well as appropriate responding to them.

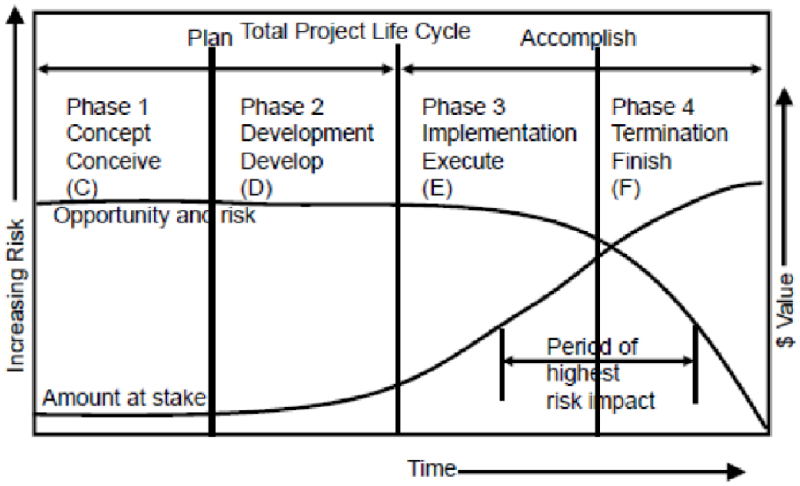

Figure 10: Risk Management

Risk management encompasses 4 Stages:

1. Risk identification.
2. Analysis of probability and consequences.
3. Risk mitigation strategies (accept, minimize, share, transfer, reserves, mentoring, training) that shall minimize the potential impact of an adverse event.
4. Control and documentation helps to classify and codify risks, responses to them and outcomes. Like this, a knowledge base for future can be created.

Qualitative Methods for Identifying Risk Factors

- Brainstorming: Bringing team together. Gathering quickly many ideas;
- Delphi method: Collect expert opinions. Can be very expensive and like this, no synergy effects between individuals can occur;
- "Experience Counts": Lessons learned from individuals in the organization that have had similar experiences;
- Multiple (team-based) assessments: A diverse group of team members that are specialized in different aspects come together, they all have different perspectives.

Risk Clusters:

- Financial;
- Technical (new and unproven technology, unique technical elements);
- Contractual/Legal;
- Execution (unknowns that can occur when plan is carried out).

Common Types: Absenteeism, Resignation, Staff pulled away, Time overruns, Skills unavailable, Ineffective Training, Specs incomplete, Change in circumstances.

Cost estimation and budgeting

Type of Cost	Description
Direct costs	Directly attributable to project, spent only in project work (material to build solar collectors).
Indirect costs	Needed for project but not restricted to it (rent, electricity).
Fixed costs	Consistent on the project regardless of how many are used (design of a book cover).
Variable costs	Fluctuate with the number that is produced (printing each copy of a book).

Table 2: Cost Estimation and Budgeting

Most Common Problems with Cost Estimation are: low initial estimates, unexpected technical difficulties, lack of definition, specification changes, external factors. A Solution to these problems can be budget contingencies, extra funds included in the budget to cover uncertainties.

Cost Estimation Methods

1. Analogous (top down) – compare to a previous project.
2. Bottom up – individual items are estimated, then summed up.
3. Activity Based Costing (ABC):
   - Assign costs to activities that use resources;
   - Identify cost drivers;
   - Compute a cost rate per cost driver unit or transaction;
   - Multiply cost driver rate * the volume of c.d.r. used.
4. Parametric – parameters around which the estimate is built.
5. Computerized/Monte Carlo – individuals items are estimated, then summed up.

Project Evaluation and Control

The Project control cycle illustrates what has to be done during project evaluation and control, naming 4 steps.

Figure 11: Project Evaluation and Control

First, of course, we have a goal set as clear and certain as possible. Second, progress in reaching the goals is measured with defined indicators. The third step is to compare the actual/measured situation with how it was planned initially. Should this not match, measures have to be planned to get back on the path as it is planned. After this, the control-cycle will be restarted from the beginning.

Relation to donors

What to communicate

- Regular updates on state of work.
- Special milestones, e.g. start-up meetings or the beginning of implementation on the ground (e.g. first building refurbished) should be highlighted.
- Successes or media outreach are something you can be proud of – show your donors!
- Always think about how much information you really want to expose. Donors have to be kept updated but you should be sure that you are ready to share and discuss details with someone who, first, is not involved in the project as deep as you are and, second, is your donor and therefor has a big say.

How to Communicate

An adequate means of communication must be figured out in the beginning. Most of communication will happen in written form via letters or e-mailing. If closer contact is required, regular phone or skype calls or meetings could be suitable.

State of the art technical appliances like clouds and other online devices allow to share information (in this case all your project documents) with anyone you want. Think about giving your donors access to certain files documenting your work in order to give him/her deep insight in the project. But again, consider how much you want to show.

References:

- Project Management Handbook, version 1.1 http://www.projectmanagement-training.net
- Manual of Project Management for Development Practitioners - GTZ.doc

UNDERSTAND HOW TO MINIMIZE RISK TO A PROJECT: Dorathy Chioma Okpokam

- Understand How to Minimize Risk to a Project
- Understand How to Manage Change to a Research Project
- Understand How to Close a Project

In the laboratory running a research is a challenge, to say the least. In all the hustle of loading the autosampler, pipetting, pouring, and mixing for research experiments, worker health and safety can be overlooked, inadvertently pushed aside or forgotten sometimes with dire consequences.

Risk is the chance that a hazard will cause harm. A hazard is something that could cause harm to someone, could damage something and causes adverse health effects, which can be either sudden or later in life. That is the reason hazard symbols are written on the laboratory containers to indicate the dangers associated with the substance inside and give information about how to work safely with the substance in the laboratory. The symbol is also designed to provide a warning, even if a person cannot understand the writing that goes with them.

Risk assessments describe how to reduce the risk of harm when carrying out an experiment. Hazards and risks are connected. A risk is the chance that a hazard will cause harm. Therefore, when evaluating a risk, think about factors such as the way the hazard causes harm, how likely it is that someone or something will be exposed to the hazard and how serious the effects of the hazard could be

A **precaution** is something that can be done to reduce a risk of harm. Different substances and different practical procedures need different precautions. A risk assessment describes the hazards and risks of harm, and what suitable precautions are needed to work more safely.
Possible precautions include, using less hazardous substances, wearing eye protection, protective gloves or other protective clothing and choosing different apparatus or a different method. Moreover, when suggesting suitable precautions, make sure the suggestions are appropriate to the particular procedure. For example, the risk of harm from hydrochloric acid is reduced if the acid is diluted with water, and if eye protection and gloves are worn.

An important step in designing your experiment involves identifying and evaluating any **potential safety risks**. Knowing what these risks are ahead of time can help you avoid accidents and dangerous situations, which helps keep the experiment safe and fun for all.

Potential risks fall into five broadly-defined categories.
1. Physical risks
2. Psychological risks
3. Social/Economical risks
4. Loss of Confidentiality
5. Legal risks

Note that it is best to weigh the potential risks of research against the potential benefits. Researchers are therefore, expected to take steps to minimize potential risks.

Physical risks include;
1. physical discomfort,
2. pain,
3. injury,
4. illness or disease brought about by the methods and procedures of the research.

A physical risk may result from the involvement of physical stimuli such as noise, electric shock, heat, cold, electric magnetic or gravitational fields, etc. Engaging a subject in a social situation which could involve violence may also create a physical risk.

Psychological risks include the production of negative affective states such as;
1. anxiety,
2. depression,
3. guilt,
4. shock

5. loss of self-esteem
6. altered behavior.

- Other examples are;
  1. Sensory deprivation,
  2. sleep deprivation,
  3. use of hypnosis,
  4. deception or mental stresses.

Social/Economic risks include;

1. alterations in relationships with others that are to the disadvantage of the subject,
2. including embarrassment,
3. loss of respect of others,
4. labeling a subject in a way that will have negative consequences,
5. or in some way diminishing those opportunities and powers a person has by virtue of relationships with others.
6. Economic risks include; payment by subjects for procedures not otherwise required,
7. loss of wages or other income and any other financial costs, such as damage to a subject's employability, as a consequence of participation in the research.

Loss of Confidentiality

1. In all research involving human subjects, confidentiality of identifiable information is presumed and must be maintained unless the investigator obtains the express permission of the subject to do otherwise.
2. Subjects have the rights to be protected against injury or illegal invasions of their privacy and to preservation of their personal dignity.
3. The more sensitive the research material, the greater the care that must be exercised in obtaining, handling, and storing data.
4. In order to minimize the risk for loss of confidentiality, investigators should only collect personal information that is absolutely essential to the research activity.
5. If personal data must be collected, it should be coded as early in the activity as possible and securely stored so that only the investigator and authorized staff may access it.
6. Identities of individual subjects must never be released without the express consent of the subject.
7. In addition, if an investigator wishes to use data for a purpose other than the one for which it was originally collected and the data are still identifiable (e.g. a code list for the data still exists), the investigator may need to obtain consent from the subjects for the new use of the data.

Legal Risks: Legal risks exist when;

- the research methods are such that the subject or others will be liable for a violation of the law, either by revealing that the subject or others have or will engage in conduct for which the subject or others may be criminally or civilly liable, or by requiring activities for which the subject or others may be criminally or civilly liable.

What need are we to do differently

1. Make hazardous events research relevant on local scales
2. Develop education programs on hazardous events
3. Identify concerns of major stakeholders
4. Train in best practices to minimize risk and vulnerability

Planning is Necessary and Everything

1. Integrate local climate change knowledge into hazardous events planning
2. Improve access by decision-makers to planning services
3. Community demonstration projects to develop policies and adaptive actions
4. Help communities identify new opportunities and adapt to changes

UNDERSTAND HOW TO MANAGE CHANGE TO A RESEARCH PROJECT:

Research is a careful and detailed study into a specific problem, concern, or issue using the scientific method. This is best accomplished by turning the issue into a question, with the intent of the researcher to answer the question.

The ability to develop a good research topic is an important skill. An instructor may assign you a specific topic, but most often instructors require you to select your own topic of interest. When deciding on a topic, there are a few things that you will need to do.

It is common to modify your topic during the research process. You can never be sure of what you may find. You may find too much and need to narrow your focus, or too little and need to broaden your focus. This is a normal part of the research process. When researching, you may not wish to change your topic, but you may decide that some other aspect of the topic is more interesting or manageable.

Choosing a Research Project Topic

While some students come to their research project with a clear research question to address, many others arrive at this point with several ideas, but with no specific research question. In view of the pressure to get started fairly quickly, this can cause anxiety and even panic. It is, however, a common situation to be in. There are several ways forward:

1. Talk to others: what topics are other students considering? Does this spark an interest? Don't wait until you have a fully formed research question before discussing your ideas with others, as their comments and questions may help you to refine your focus.
2. Look at other writing: set aside some time to spend in the library, skimming through the titles of research papers in your field over the past five years, and reading the abstracts of those you find most interesting.
3. Look through the dissertations of previous students in your department: the topics may give you inspiration, and they may have useful suggestions for further research.
4. Think about your own interests: which topic have you found most interesting, and is there an element that could be developed into a research project?
5. Is there a related topic of interest to you that has not been covered in the syllabus, but would fit with the theory or methodology you have been working with?
6. Be extra critical: is there something in your course so far that you have been skeptical about, or which you think needs further study?
7. Read about an interesting topic and keep asking the question 'Why?' This may identify a research question you could address.

When choosing a research topic, remember that the study can help in the point list below. The list is not exhaustive, although, it is advisable to check whether your department has a preference for particular kinds of research study before choosing a topic. This will prevent changing the research topic at the middle of the study.

1. It can replicate an existing study in a different setting,
2. It can explore an under-researched area
3. It can extend a previous study;
4. It reviews the knowledge thus far in a specific field;
5. It can develop or test out a methodology or method;
6. It addresses a research question in isolation, or within a wider programme of work; or
7. It can apply a theoretical idea to a real world problem.

Before embarking on any research project, a supervisor, who is an academic staff will be assigned to help guide in accomplishing the task of solving a research question. It is therefore necessary to discuss your proposed topic with a supervisor that is appropriate to supervise the project. Provided they feel that they know enough about the subject to supervise it, and provided that it can be interpreted as falling within the broad fields of your degree subject, supervisors are generally open to suggestions.

It is also necessary to put into consideration the practical aspect of the choice of topic, so as to be able to manage any changes that will be encountered during the study. Therefore, there is need to think realistically about the practical implications of your choice, in terms of the time requirement, necessary travelling, access to equipment or room space, access to the population of interest and possible costs. For example, a project on haemoglobin concentration levels of coal mining in the North East of Nigeria may require you to visit there from any distance you are, or to interview coal miners from the region. Is this something that you are prepared and able to do? If the practical considerations associated with your research ideas are unrealistic, you need to consider whether you are willing to modify or reconsider your research project.

It is important that you establish a research problem at, or close to the start of, your project. It is one of the key tools you have, to ensure that your project keeps going in the right direction. Every task you undertake should begin with you checking your research problem and asking "will this help me address this problem?"

You should be willing to revise your research problem as you find out more about your topic. You may, for example, discover that the data you were hoping to analyse is not available, or you may encounter a new piece of information or a new concept while undertaking a literature search, that makes you rethink the basis of your research problem. You should always talk to your supervisor before you make any substantial revision to your plans, and explain why you think you need to make the change.

Research Proposal

A research proposal is a more detailed description of the project going to be undertaken. It is required to submit a research proposal as part of the assessment of research project, but it is worth preparing one even if it is not a formal requirement, to guide in ascertaining your topic. It should build on the thinking that done in defining research problem; on the discussions with your supervisor; and on early reading done on the topic. A comprehensive research proposal will make you think through exactly what it is that you are going to do, and will help you when you start to write up the project.

You may find that some of these headings are difficult to fill in right at the start of your project. However, you can use the gaps to help identify where you need to begin work. If, for example, you are unsure about the limitations of your methodology you should talk to your supervisor and read a bit more about that methodology before you start.

Creating a Research Plan

A dissertation is an extended project that asks you to manage your time and undertake a variety of tasks. Some courses schedule the dissertation at the end, while others have it running along concurrently with other modules. Whichever way your course is organised, it is essential that you create a plan that helps you allocate enough time to each task you have to complete.

It is useful to work out how many weeks you have until you need to submit your completed dissertation, and draw a chart showing these weeks. Block out the weeks when you know you will be unable to work, and mark in other main commitments you have that will take time during this period. Then allocate research tasks to the remaining time.

It is very important to be realistic about how long each task is likely to take. Some focused thought at the beginning, then at the planning stage of each phase, could save hours later on. Write down the resources needed for each stage. It could be time in the library; the resource of your working hours; or the use of equipment or room space that needs to be booked in advance.

The Supervisor's Role in Research Project

Although a research project is an opportunity for you to work independently, you will usually be allocated a member of academic staff as a supervisor. Supervisors are there to help you shape your ideas and give you advice on how to conduct the research. They are not there to teach you the topic you have chosen to investigate: this is your project. They are, however, one of the resources that you can call on during your research.

Academics (supervisors) are busy people, so to get the most out of them you will need to be organised and to take responsibility for the relationship. It is not your supervisor's job to chase you into completing your research, or to tell you how to manage the different stages of the project. To ensure that you get the most out of your supervisor you need to:

1. agree a timetable of meetings at the start of your project and stick to it;
2. make sure that each meeting has a focus e.g. "setting a research problem", "analysing the data";
3. send something that can form the basis of a discussion about your progress to your supervisor before each meeting. This could include your research plan, early results of your data collection or draft chapters;
4. turn up on time to each meeting you have arranged. Do not assume that your supervisor is available at all times to see you;
5. at the end of each supervision agree some action points for you to focus on before the next time you meet; and
6. keep a record of what you decide in supervision sessions.

If you are not happy with the way you are being supervised, explain why to your supervisor or discuss the issue with your personal tutor. Visiting your supervisor regularly will help you manage any change to your research project.

Undertaking a Literature Survey

Regardless of whether you have been given a research topic or you have developed your own ideas, you will need to be able to demonstrate the rationale for your research, and to describe how it fits within the wider research context in your area. To support you in doing this you will need to undertake a literature review, which is a review of material that has already been published, either in hard copy or electronically, that may be relevant for your research project. Key tools that are available to help you, include:

1. internet search engines, especially ones that offer advanced search features (see http://www.google.com/ and http://scholar.google.com/);
2. the University Library Catalogue;
3. electronic journals available via the library; and
4. bibliographies in any key texts about your topic.

You will probably generate more references than you can read. Use the titles and abstracts to decide whether the reference is worth reading in detail. Be selective by concentrating on references that are recommended by your supervisor, contain a high number of specifically relevant keywords, are cited in a number of other works and are published in the last five years, unless they are key texts in your field.

Data Collection

For most research projects the data collection phase feels like the most important part. However, you should avoid jumping straight into this phase until you have adequately defined your research problem, and the extent and limitations of your research. If you are too hasty you risk collecting data that you will not be able to use.

Consider how you are going to store and retrieve your data. You should set up a system that allows you to:

1. record data accurately as you collect it;
2. retrieve data quickly and efficiently;
3. analyse and compare the data you collect; and
4. create appropriate outputs for your dissertation e.g. tables and graphs, if appropriate.

There are many systems that support effective data collection and retrieval. These range from card indexes and cross-referenced exercise books, through electronic tools like spreadsheets, databases and bibliographic software, to discipline-specific tools. You should talk about how you plan to store your data with your supervisor. As you undertake your research you are likely to come up with lots of ideas. It can be valuable to keep a record of these ideas on index cards, in a dedicated notebook, or in an electronic file. You can refer back to this 'ideas store' when you start to write. They may be useful as ideas in themselves, and may be useful as a record of how your thinking developed through the research process.

Research Pilot Studies

A pilot study involves preliminary data collection, using your planned methods, but with a very small sample. It aims to test out your approach, and identify any details that need to be addressed before the main data collection goes ahead. For example, you could get a small group to fill in your questionnaire, perform a single experiment, or analyse a single novel or document.

When you complete your pilot study you should be cautious about reading too much into the results that you have generated (although these can sometimes be interesting). The real value of your pilot study is what it tells you about your method.

1. Was it easier or harder than you thought it was going to be?
2. Did it take longer than you thought it was going to?
3. Did participants, chemicals, processes behave in the way you expected?
4. What impact did it have on you as a researcher?

Spend time reflecting on the implications that your pilot study might have for your research project, and make the necessary adjustment to your plan. Even if you do not have the time or opportunity to run a

formal pilot study, you should try and reflect on your methods after you have started to generate some data.

Managing the Problems Encountered
Once you start to generate data you may find that the research project is not developing as you had hoped. Do not be upset that you have encountered a problem. Research is, by its nature, unpredictable. Analyse the situation. Think about what the problem is and how it arose. Is it possible that going back a few steps may resolve it? Or is it something more fundamental? If so, estimate how significant the problem is to answering your research question, and try to calculate what it will take to resolve the situation. Changing the title is not normally the answer, although modification of some kind may be useful.

If a problem is intractable you should arrange to meet your supervisor as soon as possible. Give him or her a detailed analysis of the problem, and always value their recommendations. The chances are they have been through a similar experience and can give you valuable advice. Never try to ignore a problem, or hope that it will go away. Also don't think that by seeking help you are failing as a researcher.
Finally, it is worth remembering that every problem you encounter, and successfully solve, is potentially useful information in writing up your research. So don't be tempted to skirt around any problems you encountered when you come to write-up. Rather, flag up these problems and show your examiners how you overcame them.

UNDERSTANDING HOW TO CLOSE A PROJECT:
Science or Medical projects can be closed due to a variety of reasons like;

1. because the problem it is trying to solve has been fixed
2. there is a lack of funding
3. the organisation no longer has permission to operate in the area
4. the security situation has deteriorated

Proper Documentation
You do not just throw all the paperwork away in some boxes and turn off the lights (especially if you do not want the project to close). This approach makes it more difficult for lessons to be learnt and for the project to open again in the future.

- Make sure you collect form the onset all the documentation, both hard and soft copies from the project.

It should include technical documentation, such as logframes and reports. Moreso, administrative documentation like staff files and tax declarations.
The following should be done;

1. Carefully file all the hard and soft copies in a logical folder structure.
2. In the future, someone might want to open the project again or find an important document.
3. This will only be possible if you have filed things properly.

Always Share lesson learnt from the project
Your project might be closing, but there are still other similar projects that could benefit from the lessons you have learnt.
Firstly; make a list of the most important things that were learnt during the project.
Secondly; think about how you can communicate these lessons to other people running similar projects. For example, having seminars internally, you could post a report online, publish a journal article, speak at a conference, or even write a review article.

Dispose of assets transparently

1. Most projects have assets like vehicles, computers and furniture.
2. You should dispose of these items in a transparent way, following the requirements of the donor.
3. It is not appropriate for assets to be given away to staff or sold at a cheap price to friends or family.
4. Donor requirements differ, so abide to the guideline given by donors

Steps to take when disposing of assets:

1. Make a list of all the assets that belong to the project.
2. Assess the value of each item. For example, take the vehicles to a qualified mechanic for a valuation and also check the prices of used cars in the newspaper.
3. Advertise an auction sale publicly in the newspaper or other mass media.

4. On the day of the auction sell each item to the highest bidder. Collect the revenue and put it in the project account.

What to do with the Remaining funds

1. All remaining funds, including any funds raised from the auction of assets, should be returned to the donor.
2. Some organisations (and even donors) encourage you to spend all the remaining money (on any worthwhile project).
3. Some donors allow you to transfer the remaining funds to another project that has a similar objective.
4. In other cases, funds (or even assets) can be donated to related government departments. For example, remaining medical equipment could be donated to a local hospital.

Close all accounts, subscriptions and other services (if any)

As the final step in the process, you will need to close the project bank account. Don't forget to cancel other subscriptions or services that may be paid from the account. For example, website hosting fees, journal subscriptions, telephone lines, rent, etc.

Help employees find a new job (if applicable)

If the project had full time staff, then the closure of the project will mean these employees have been made redundant. Finding a new job can be difficult. You can assist by helping review their CV, providing a written referral, and introducing them to other organisations that may be looking to hire.

Conclusion

Closing a project is a critical component of all research projects. If it is done well, closeout can provide the platform for future research projects and research funding, but if it is done poorly can potentially make it difficult to gain future funding for the individual and the organisation or even have negative consequences.

MODULE 5: SCIENTIFIC WRITING AND PUBLISHING by Dr. Rose Amaechi

- Understand the publishing process, including why manuscripts get accepted/rejected
- Discuss construction of figures and tables
- In-class writing exercises include the all-important abstract and a cover letter for submission of your manuscript to a journal
- Respond effectively to reviewers' comments

Scientific publications are art and sciences where results and knowledge derived by science are shared and taught to others in the world. Results are of no use to anybody if they are not made available to other experts, to be discussed, critically evaluated and built upon. Consequently, ever since the beginnings of modern science, various forms of publishing have played a central role in the work of researchers who need to be able to present their work intelligibly in written form to have it recognized by their peers (Rational Wikki, 2015).

Types of Scientific publications

- Research paper
- Peer review
- Comparison of publication venues

Research paper

They are articles published in scientific journals, ranging from a few to at most a few dozen pages. In the natural sciences, research papers have today become the most important means of communicating results.

Peer review

Before publication in reputable journals, scientific articles are generally sent out to two or more reviewers or referees from the same field of research to examine the quality of the paper.

Comparison of publication venues

The prestige that is connected with different types of publications, e.g. book vs. article, differs between research fields, partly because of tradition, but partly because of the type of research that is conducted. Books are relatively hard to assess except by relying on the opinion of qualified colleagues.

COVER PAGE

On the first page of the paper, you must present the title of the paper along with the authors' names, institutional affiliations, and contact information. The corresponding author(s) (i.e., the one[s] who will be in contact with the reviewers) must be specified, usually with a footnote or an asterisk (*), and their full contact details (e.g., email address and phone number) must be provided. For example:

Dr. Clara A. Bell[1,*] and Dr. Scott C. Smith[2]

[1]University of Areopagitica, Department of Biology, Some town, Some country

[2]Leviathan University, Department of Biochemistry and Biomedical Sciences, Some town, Some country

*clara.bell@emailaddress.com

ABSTRACT

A short summary of all the relevant information contained within the paper. This still applies today when trying to manually refine a search for information. The abstract is often written in an odd passive-present tense, but not always. Sometimes written as an afterthought, the abstract is of extreme importance as in many instances this section is what is initially previewed by readership to determine if the remainder of the article is worth reading. This is the authors opportunity to draw the reader into the study and entice them to read the rest of the article. The abstract is a summary of the article or study written in 3rd person allowing the readers to get a quick glance of what the contents of the article include. Writing an abstract is rather challenging as being brief, accurate and concise are requisite. The headings and structure for an abstract are usually provided in the instructions for authors. In some instances, the abstract may change slightly pending content revisions required during the peer review process. Therefore, it often works well to complete this portion of the manuscript last. Remember the abstract

should be able to stand alone and should be as succinct as possible. In this summary of your research, you must state your subject (i.e., what you did) and encapsulate the main findings and conclusions of your paper.

INTRODUCTION

The introduction is one of the more difficult portions of the manuscript to write. Past studies are used to set the stage or provide the reader with information regarding the necessity of the represented project. For an introduction to work properly, the reader must feel that the research question is clear, concise, and worthy of study. A competent introduction should include at least four key concepts: 1) significance of the topic, 2) the information gap in the available literature associated with the topic, 3) a literature review in support of the key questions, 4) subsequently developed purposes/objectives and hypotheses. When constructing a review of the literature, be attentive to "sticking" or "staying true" to your topic at hand. Don't reach or include too broad of a literature review. For example, do not include extraneous information about performance or prevention if your research does not actually address those things.

The literature review of a scientific paper is not an exhaustive review of all available knowledge in a given field of study. That type of thorough review should be left to review articles or textbook chapters. Throughout the introduction (and later in the discussion!) remind yourself that a paper, existing evidence, or results of a paper cannot draw conclusions, demonstrate, describe, or make judgments, only PEOPLE (authors) can. "The evidence demonstrates that" should be stated, "Smith and Jones, demonstrated that…." Conclude your introduction with a solid statement of your purpose(s) and your hypothesis(es), as appropriate.

The purpose and objectives should clearly relate to the information gap associated with the given manuscript topic discussed earlier in the introduction section. This may seem repetitive, but it actually is helpful to ensure the reader clearly sees the evolution, importance, and critical aspects of the study at hand See Table 1 for examples of well-stated purposes.

This is the reader's first impression of your paper, so it should be clear and concise. Include relevant background information on your topic, using in-text citations as necessary. Report new developments in the field, and state how your research fills gaps in the existing research. Focus on the specific problem you are addressing, along with its possible solutions, and outline the limitations of your study. You can also include a research question, hypothesis, and/or objectives at the end of this section. The introduction summarizes the relevant literature so that the reader will understand why you were interested in the question you asked. One to four paragraphs should be enough. End with a sentence explaining the specific question you asked in this experiment.

METHODS

The experimental section covers materials, methods and explains the procedures used in the paper. This is often full of technical detail, precise spectrometer frequencies, equipment specifications or the origin of materials. Due to the technical nature of these sections, they are sometimes pushed to the back, or rendered in a smaller font, or perhaps moved to the supplementary materials.

This is the part of your paper that explains *how* the research was done. You should relate your research procedures in a clear, logical order (i.e., the order in which you conducted the research) so that other researchers can reproduce your results. Simply refer to the established methods you used, but describe any procedures that are original to your study in more detail.

RESULTS

This, in a self-explanatory manner, states the results of experiments or work carried out. Depending on the nature of the work, results may be mixed in with discussion. Results sections can also be split into several parts forming distinct parts of a paper. For example, one section may discuss experimental findings while another looks at computer models to support this.

Now that you've explained *how* you gathered your research, you've got to report *what* you actually found. In this section, outline the main findings of your research. You need not include too many details, particularly if you are using tables and figures. While writing this section, be consistent and use the smallest number of words necessary to convey your statistics.

DISCUSSION

In this section, you interpret your findings for the reader in relation to previous research and the literature as a whole. Present your general conclusions, including an assessment of the strengths and weaknesses of the research and the implications of your findings. Resolve the hypothesis and/or research question you identified in the introduction.

In most journals the results section is separate from the discussion section. It is important that you clearly distinguish your results from your discussion. The results section should describe the results only. The discussion section should put those results into a broader context. Report your results neutrally, as you "found them". Again, be thoughtful about content and structure. Think carefully about where content is placed in the overall structure of your paper. It is not appropriate to bring up additional results, not discussed in the results section, in the discussion. All results must first be described/presented and then discussed. Thus, the discussion should not simply be a repeat of the results section.

Carefully discuss where your information is similar or different from other published evidence and why this might be so. What was different in methods or analysis, what was similar? As previously stated, stick to your topic at hand, and do not overstretch your discussion! One of the major pitfalls in writing the discussion section is overstating the significance of your findings or making very strong statements. For example, it is better to say: "Findings of the current study support…." or "these findings suggest…" than, "Findings of the current study prove that…" or "this means that….". Maintain a sense of humbleness, as nothing is without question in the outcomes of any type of research, in any discipline! Use words like "possibly", "likely" or "suggests" to soften findings. Do not discuss extraneous ideas, concepts, or information not covered by your topic/paper/commentary. Be sure to carefully address all relevant results, not just the statistically significant ones or the ones that support your hypotheses. When you must resort to speculation or opinion, be certain to state that up front using phrases such as "we therefore speculate" or "in the authors' opinion". Remember, just as in the introduction and literature review, evidence or results cannot draw conclusions, just as previously stated, only people, scientists, researchers, and authors can! Finish with a concise, 3-5 sentence conclusion paragraph.

This is not just a restatement of your results, rather is comprised of some final, summative statements that reflect the flow and outcomes of the entire paper. Do not include speculative statements or additional material; however, based upon your findings a statement about potential changes in clinical practice or future research opportunities can be provided here.

Conclusion
This section is sometimes included in the last paragraph of the discussion. Explain how your research fits within your field of study, and identify areas for future research. Writing for publication can be a challenging yet satisfying endeavor. The ability to examine, relate, and interlink evidence, as well as to provide a peer reviewed, disseminated product of your research labors can be rewarding. A few suggestions have been offered in this commentary that may assist the novice or the developing writer to attempt, polish, and perfect their approach to scholarly writing.

If separate from the results, this section puts the results of the research into a larger context, analyzes their significance (or not) and suggests additional studies. Sometimes there is a separate " conclusions " section towards the end of the paper that further summaries the important results and implications.

Acknowledgments
Write a brief paragraph giving credit to any institution responsible for funding the study (e.g., through a fellowship or grant) and any individual(s) who contributed to the manuscript (e.g., technical advisors or editors).

References
Here you list citation information for each source you used (i.e., author names, date of publication, title of paper/chapter, title of journal/book, and publisher name and location). The list of references can be in alphabetical order (author–date style of citation) or in the order in which the sources are presented in the paper (numbered citations). Follow your style guide; if no guidelines are provided, choose a citation format and be consistent.

FORMATTING TIPS:

- While doing your final proofread, ensure that the reference list entries are consistent with the in-text citations (i.e., no missing or conflicting information).
- Many citation styles use a hanging indent and may be alphabetized. Use the styles in Microsoft Word to aid you in citation format.
- Use EndNote, Mendeley, Zotero, RefWorks, or another similar reference manager to create, store, and utilize bibliographic information.

Conclusion

Even though you may not look forward to the process of formatting your research paper, it's important to present your findings clearly, consistently, and professionally. With the right paper format, your chances of publication increase, and your research will be more likely to make an impact in your field. Don't underestimate the details. They are the backbone of scientific writing and research.

RESPOND EFFECTIVELY TO REVIEWERS' COMMENTS

The reviewing process can significantly improve your manuscript by allowing you to take into account the advice of multiple experts in your field. Indeed, empirical evidence sug-gests that papers that have undergone multiple rounds of peer review fare better in terms of citation counts than papers that are quickly accepted (Calcagno, V., Demoinet, E., Gollner, K., Guidi, L., Ruths, D., deMazancourt, C. 2012). A well-crafted "response to reviewers" document is a critical part of your response. This document is submitted alongside your revised manuscript, summarizing the changes that you made in response to the critiques.

The following are simple rules that can help in formulating an effective response to reviewers.

1. Provide an overview, then quote the full set of reviews
2. Be polite and respectful of all reviewers
3. Accept the blame
4. Make the response self-contained
5. Respond to every point raised by the reviewer
6. Use typography to help the reviewer navigate your response
7. Whenever possible, begin your response to each comment with a direct answer to the point being raised
8. When possible, do what the reviewer asks
9. Be clear about what changed relative to the previous version
10. If necessary, write the response twice
11. *Mindful* **(make it easy for the editor – they will appreciate it!)**

Your resubmission should contain four things:

1. *Cover letter*
    - A brief and polite cover letter addressed to the editor should accompany your resubmission. Generally written by the corresponding author, your cover letter should include your manuscript details and a brief statement to note the resubmission. A sincere thanks to the editor for the opportunity to improve and resubmit your manuscript is also a nice touch.
2. *List of responses*
    - Include the list that you created with each of the reviewers' comments and your response. This list not only paints you as an organised, methodical researcher, but also makes it easier for the editor to reassess your manuscript.
3. *Track changes document*
    - Return your revised manuscript with your revisions highlighted. Use a tool like Microsoft Word's "track changes" feature (or something similar) to illustrate how and where your revised manuscript has been changed. This is the easiest way to show the editor that you have indeed made all the changes you listed!
4. *Clean version*
    - Submit a "clean" version of your manuscript to show your work in its final form. This file is usually uploaded as the "manuscript" file and allows the editor to read your work without the distraction of marked-up detail, ensuring that it is ready for production.

    (Calcagno, V., Demoinet, E., Gollner, K., Guidi, L., Ruths, D., deMazancourt, C. 2012; Catherine Carnovale, 2019)

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SOME USEFUL RESOURCES:

Sun, H., & Linton, J. D. (2014): Structuring papers for success: Making your paper more like a high impact publication than a desk reject, *Technovation.*

Tewin, K. (2015): How to Better Proofread an Article in 6 Simple Steps,

Vitse, C.L., and Poland, G.A. (2012): Plagiarism, self-plagiarism, scientific misconduct, and VACCINE: protecting the science and the public. *Vaccine*;**30**(50):7131–3.

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THE PUBLISHING PROCESS: - Nkencho M.T. and Olayanju A.O.D.

OUTLINE

- Introduction
- Peer review process
- Types of peer review
- Possible outcomes of peer review
- Reasons for rejecting of a manuscript
- What to do after rejection
- Construction of figures and tables

INTRODUCTION

Manuscripts have been subjected to peer review for many years and is used by almost all scientific journals currently. Peer review is an established and essential part of the publication process (Lee et al., 2013). It involves evaluating an academic work by scholars of the same discipline and is used by publishers to determine the strength and weaknesses of a potential proposed piece of work (Pierson, 2011). The peer review process serves several purposes some of which include; selecting articles of quality for publication, general improvement to the quality of a manuscript for publication and providing editors with evidence as to if articles meet the criteria for publication (Hames, 2008).

THE PEER REVIEW PROCESS

https://authorservices.wiley.com/asset/photos/Peer-Review-Process.pdf

The publication process starts with submission of manuscript to a journal by an author. Once an author submits a manuscript to an editor it is then read either individually or in consultation and this is done to ascertain if the manuscript is suitable for the journal in accordance with the guidelines determined by the editorial policy. The purpose of this is to ensure that the manuscript falls within the scope of the journal, that it follows the guidelines of the editorial policy and that it does not overlap with any manuscripts currently in publication (Michael and Barbara, 2012).
The process is as highlighted below:

- **Submission of Paper**: The submitting author submits the paper to the journal. This is usually via an online system such as Scholar-One Manuscripts. Occasionally, journals may accept submissions by email. There are some points to be noted in the submission of manuscripts to a

journal such as; duplicate submissions are not allowed and another journal can only be approached after a review and rejection has been received (Noni *et al*., 2006).

- **Editorial Office Assessment**: The journal checks the paper's composition and arrangement against the journal's Author Guidelines to make sure it includes the required sections and stylizations. The quality of the paper is not assessed at this point. Submissions are pre-screened for; adherence to editorial policies, adherence to ethical standards and potential conflicts of interests among others. Manuscripts that do not meet the initial evaluation are immediately rejected (Berhanu, 2017).

- **Appraisal by the Editor-in-Chief (EIC)**: The EIC checks that the paper is appropriate for the journal and is sufficiently original and interesting. If not, the paper may be rejected without being reviewed any further. In general, it is the job of the editor-in-chief to receive new submissions and assign them to associate editors (Mark, 2008).

- **EIC Assigns an Associate Editor (AE)**: Some journals have Associate Editors who handle the peer review. If they do, they would be assigned at this stage. The associate editor makes recommendations to the editor-in-chief about decisions on the submissions (Graham, 2008).

- **Invitation to Reviewers and response**: The handling editor sends invitations to individuals he or she believes would be appropriate as reviewers. As responses are received, further invitations are issued, until the required number of acceptances is obtained; commonly this is 2, but there is some variation between journals. Potential reviewers consider the invitation against their own expertise, conflicts of interest and availability. They then accept or decline. In addition, if accepted; most journals now specify to reviewers when a review is done and send reminders to remind them to complete and submit their review on time (Parveen and Roger, 2016).

- **Review is Conducted**: The first read is used to form an initial impression of the work. If major problems are found at this stage, the reviewer may feel comfortable rejecting the paper without further work. Otherwise they will read the paper several more times, taking notes so as to build a detailed point-by-point review. The review is then submitted to the journal, with a recommendation to accept or reject it – or else with a request for revision (usually flagged as either major or minor) before it is reconsidered. Although manuscripts can be rejected without a review, they cannot be accepted without one (Michael and Barbara, 2012).

- **Journal Evaluates the Reviews and decision is communicated**: The handling editor considers all the returned reviews before making an overall decision. If the reviews differ widely, the editor may invite an additional reviewer so as to get an extra opinion before making a decision. The editor sends a decision email to the author including any relevant reviewer comments. Peer review is important as it helps inform the editor on the manuscript for publication among the many submitted (Broome, 2010).

TYPES OF PEER REVIEW

There are two main types of peer review; open peer review and closed peer review

Closed peer review: in the closed peer review system, the identity of one of the parties in the review process is unknown; usually the reviewers. It works in two ways either single blind or double blind. In single blind review, the author is not aware of the reviewer's identities but the reviewer is aware of the author's identities and credentials. The single blind review is most commonly used in academic and scientific journals (Kearney and Freda, 2005). Some of the criticisms to this method is that there could be bias on the part of the reviewers as they know the author but despite this it is the most commonly used method (Parveen and Roger, 2016).

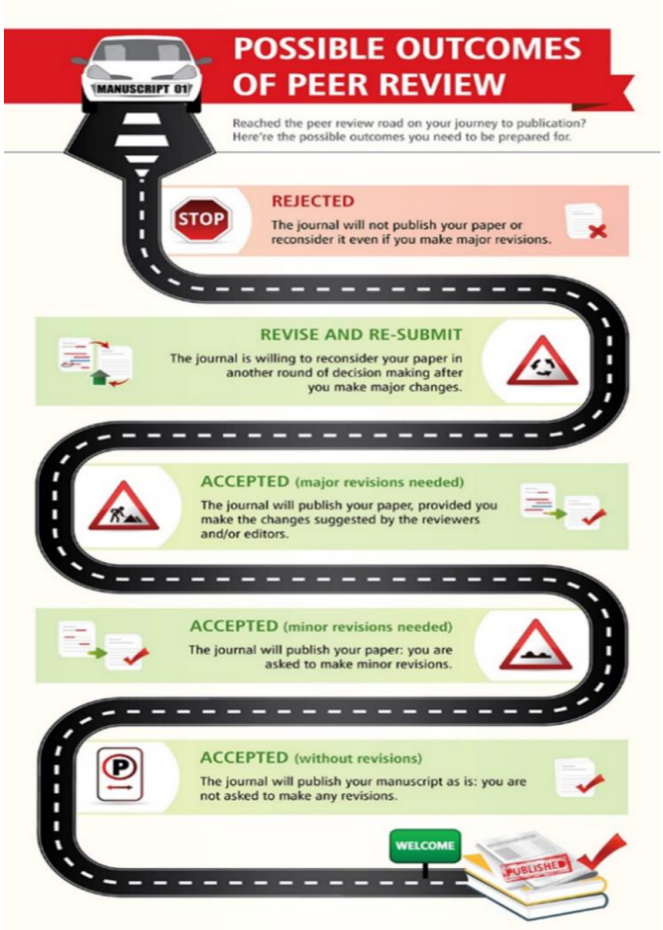
Double blind review: in the double blind review neither the author nor the reviewer are aware of each other's identities or credentials. Supporters of this review process argue that it eliminates bias as neither of the identities are revealed whereas opponents believe that it does not improve the review process quality (Shea *et al*., 2001).

Open peer review: in this peer review process, the identity of the author and the reviewer are known to each other. The names of the author and the reviewer are published along with the option to publish

the reviewer's reports. Proponents believe that this process allows the authors intellectual property rights to be respected (Dividoff and DeAngelis, 2001).

POSSIBLE OUTCOMES OF PEER REVIEW

1) **Accept in its present form:** The journal will publish the paper in its original form. This type of decision outcome is rare
2) **Accept with minor revisions:** This means that minor changes need to be made for it to be accepted however it does not guarantee acceptance. It is also known as conditional acceptance.
3) **Accept with major revisions:** this is when a manuscript needs to be improved substantially before acceptance. The revised manuscript is usually sent for a second round of peer review and usually the same set of reviewers from the first time. If the author is unable to revise according to the comments from the reviewer, the paper may be rejected.
4) **Revise and submit:** this occurs when after a rejection, an editor is willing to reconsider if the manuscript is revised substantially and resubmitted as a new submission. This submission need to be accompanied by a letter stating the original submission and how the reviewer's comments have been addressed.
5) **Reject:** this is an outright rejection and in most cases will not be reconsidered even if revisions are made (Kakoli, 2014).



https://insights.cactusglobal.com/sites/default/files/Possible%20outcomes%20of%20the%20peer%20review%20process.jpg

REASONS FOR REJECTING A MANUSCRIPT

There could be a number of reasons for denial some of which include;

1) Lack of novelty or originality and presentation of an obsolete study
2) Unimportant or irrelevant subject matter
3) Flaws in methodology
4) Inappropriate or incomplete statistics

5) Inappropriate for the journal
6) Lack of interpretation of results
7) Improper rationale or failure to adhere to the theme of the manuscript

(Javed, 2010).

WHAT TO DO AFTER REJECTION

If your manuscript gets rejected, one of the following steps could be taken:

- Appeal your rejection: this is one of the rights of an author but should be based on logic and not emotion. Outline your points to the reviewer without being argumentative. However, appeals based on the scope of the work or impact are unlikely to succeed
- Resubmit to the same journal: after rejection, a journal may be give you the offer to resubmit your work after corrections have been made. This could be your top choice if publishing in that journal is important. Before resubmitting consider if another journal with a different scope or audience is a better choice.
- Make changes and submit to a different journal: this is the most common option. Changes could be made from reviewer's comments and resubmitted to another journal. Papers that have been reviewed and revised before submission to another journal are usually in better shape overall.
- Make no changes and submit to another journal: this is an easy option but not a good idea. Some of the comments given by the reviewer might improve your manuscript. New reviewers might pick up on the same issues and you would have had a chance to correct your work ahead of time.
- File away the manuscript and never submit: rejection can be disheartening and it could be easy to decide your paper is not worth the stress. However, it does not help the research community as the paper might help someone else's work or be the missing link to someone else's paper.

Most people receive rejection letters. The review process is done by people with substantial expertise who have devoted time to give advice about your paper. This feedback will help in future submissions. As well volunteering in other journals will improve your editing skills. (Gail, 2015).

Peer Review Summary

Scholarly publication is the means by which new work is communicated and peer review is an important part of this process. Peer review is an integral part of the publishing process and it is generally done by individuals who are experts in a research area. There are three common types of peer review; single blind, double blind and open peer review. It is a quality control mechanism that is used to determine what is published, and what is not. The type of peer review used is the dependent on the journal of publication, each having its merits and demerits. Journals are rated based on adherence to standard publishing ethics and guidelines during the publishing and peer review process; after submission, the manuscript is assessed by an editor, appraised by an editor in chief and invitations are sent out to the prospective reviewers. The review is conducted and the journal decides based on the reviews and the decision reached is communicated to the author. The reviewer assesses the originality, conciseness, completeness and scientific significance of the paper. To be suitable for publication, factors to be considered include the relevance of the topic, originality, adherence to guidelines and formatting, ethical considerations, appropriate methodology, replicability etc. The reviewer's role is to ascertain if the work has major flaws in any of these or if the author is challenging current academic consensus; is there enough evidence for the case. The outcome of the review may be rejection, acceptance with minor revision, acceptance with major revisions needed or acceptance with no revisions which is rare. The conclusion reached about the manuscript is communicated to the author, after which the manuscript might either be accepted and published or rejected with either a possible chance or no chance of resubmission.

CONSTRUCTION OF FIGURES AND TABLES

Tables and figures play an integral part in a scientific paper. The bulk of the information is presented in tables and the descriptions, trends and some conclusions are presented in figures. In construction of tables for a manuscript certain things should be noted:

- The number of tables in the manuscript should not exceed the number recommended by the editorial board of the journal.
- Data should not be repeated many times in text and tables.
- The tables should be comprehensible without the reader looking at the text.
- The data in the table should comply with those in the text and each unit of variable should be well defined.
- Use of abbreviations in tables should be avoided and if they cannot be then they should be defined explicitly in footnotes or legends of the tables. (Tuncel, 2013).

Figures are often the best means of representing data. They encompass four different types of illustrations or could be a combination of both; graphs (pie, line, bar etc.), line drawings or maps, photographs and micrographs or animated illustrations. Graphs and charts improve the general presentation by reporting data in an easy and comprehensible manner. For figures the selection of appropriate graphs for the demonstration of information is critical and the following should be noted;

- Graphs should not display information provided in the text.
- In the case of graphs, independent variables should be represented on the horizontal and dependent variables on the vertical axis.
- The labels on each axis should be easily understandable.
- The label on the Y-axis should be written from bottom to top vertically.
- The meaning of abbreviations and acronyms used in the graphs should be provided in the notes. As well as the statistical tests used, sampling size and levels of significance used in the analyses should be written in order to help comprehension of study procedures.

There should be a balance between the figures and tables in a manuscript. The figures that do not show any major patterns or trends or differences between two groups should be omitted. Figures as well as tables should be appropriately titled so as to be understood on their own (Lakshimi and Sandhya, 2015).

Construction of Tables and Figures Summary

In scientific research, large amounts of data are discovered, most of which can be easily expressed and summarized by the use of figures and tables. Data presentation in an important aspect of writing a research paper, and takes into consideration if the results is more easily conveyed with text or figures and tables; both of which are used to illustrate concepts and support conclusions. Tables are used to compare and contrast data or characteristics among related items or items with shared characteristics or variables. They show the presence or absence of specific characteristics while figures show trends or patterns among data sets. The pattern generated is of more importance than the specific data when figures are presented. In research work the figures and tables must be self-explanatory and easily understood independent of text. It is important to consider the intended journal of publication as different journals may have specific instructions in the preparation of figures and tables as it relates to the number you can include, numbering styles, title, image resolutions, etc. If an author is using a figure or table already published, permission must be taken from the copyright holder acknowledging the source. Tables with similar information should be grouped together for easy understanding by the reader and all figures and tables must be labeled accordingly. Tables and figures are important tools in passing across information and help to give the manuscript a more professional feel. They also help to attract the attention of the reader and are extremely useful in presenting large volume of information; as such their importance cannot be over emphasized.

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