

DIAGNOSTICS UPDATE .COM

NEWSLETTER
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Editors Note



"Individual commitment to a group effort - that is what makes a team work, a company work, a society work, a civilization work."

"The irony of commitment is that it's deeply liberating - in work, in play, in love."

So, go ahead and be committed to whatever it is you do. As health workers, when we graduate to do whatever we do, we make a pledge, a commitment, to say your health has become our life. And that is very liberating. But as much as that is so, you as a patient have to be committed to your health. It's all good and fine to visit your health practitioner and then later complain about how you have not been assisted properly, but if you are committed to your health you will be assertive and ask all the information that you feel is necessary and leave a more informed person rather than just a patient. Teamwork!! Be a team with your health provider.

To digress, due to my recent nuptials, I feel marriage like any other form of commitment requires team work and can be liberating when done right. I hope I can find that balance and be able to make my wife my number one commitment as we begin our new life in marriage.

Now to what we have in store for you in this edition; we have a very introspective article on the challenges in the laboratory. This is a sequel (so to speak), of the article in our previous edition on laboratory management and quality systems which I did not acknowledge him on. We also look into a few issues to do with blood clotting. These I hope will make interesting reading for a lot of people I have dealt with when I was doing coagulation tests at our Village laboratory.

Also watch out for the pictorials of our open-nights and also the official opening of the DML main offices and laboratory. Pretty special!!

Until our next issue, come and experience our world-class offices and experience world-class service.



From left: DML Managing Director, Mr. M.I. Chand, MoH Permanent Secretary, N. Kahiye, Minister of Health, Lesego Motsumi, Former President Festus Mogae at the official opening of the DML premises



DIAGNOFIRM MEDICAL LABORATORIES

Recent And Upcoming Events @ Diagnofirm

As usual Diagnofirm has been doing its share in the community and setting trends in the laboratory business. It has been exciting times at Diagnofirm!

Firstly there was the official opening of DML's main offices and laboratory on the 23rd of August. This turned out to be a very successful and momentous day in the history of Diagnofirm. Diagnostics-Update.com hopes this date shall be used as an excuse to party in future to celebrate the anniversary. Hip-hip, Hooray!!!

The official opening was preceded by four open-nights of the lab to health practitioners and other invited guests. These nights involved the touring of the lab and explanation of the goings on to produce results. The aim of these was to

put a face to the company and to give the doctors and other stakeholders an opportunity to experience the laboratory atmosphere and also to demonstrate the latest state of the art technology involved in producing DML's high quality results.

On the philanthropy side of things, DML has been to the Moshupa community twice, firstly to donate blankets to the underprivileged. This was a timely donation with winter season beckoning. It is commendable that Diagnofirm understands the value of working with Chiefs and their communities to achieve the best possible outcome for the most vulnerable members of our communities.

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Can I take Paracetamol if I'm on Warfarin?



Warfarin is given to some people to prevent blood clots from forming or growing larger. It works by altering certain chemicals in the blood to stop the blood from clotting so easily.

If you are given warfarin you will need regular blood tests to check on how quickly your blood clots. This tests measures the international normalised ratio, or INR. The aim is to get the dose of warfarin and the INR just right so your blood does not clot as easily as normal, but not so much as to cause bleeding problems.

It can take some time to get this balance right. Some medicines can affect how well warfarin works, and so alter the balance of the blood not clotting as easily and bleeding problems.

You should consult your doctor nurse before taking any new medicine. It might affect how well your warfarin works.

Some painkillers can affect how well warfarin works:

PARACETAMOL

Taking small occasional doses of paracetamol, for example 5 tablets (5 x 500mg) or less per week, is unlikely to change your INR. Taking more than small occasional doses of paracetamol, or taking it for longer periods may raise your INR and cause the blood to become slower at clotting. This means you are at risk of bleeding. This is more likely to occur if paracetamol is taken in doses greater than 2 grams (4 tablets) daily for more than a few days.

If you are taking large doses of paracetamol for more than a few days, or if you require paracetamol long-term, you should visit your doctor to have your INR

checked. Your INR should be monitored more closely for a short while after starting the paracetamol to determine if your warfarin dose needs to be adjusted. If paracetamol affects your warfarin, the most noticeable effects are seen between 1-3 weeks after starting paracetamol, although the effects can be seen earlier.

CODEINE AND PARACETAMOL PREPARATIONS

Codeine is not thought to commonly affect warfarin. However, both medicines also contain paracetamol and so you should follow the same advice as for paracetamol. To find out if the pain medicine you are taking has codeine, check the drug leaflet or ask the pharmacist.

ASPIRIN AND IBUPROFEN

Generally aspirin and ibuprofen should not be taken as painkillers when on warfarin, as they increase the chance of bleeding. Sometimes they may be prescribed or recommended by your doctor, but this should only be done cautiously and with close monitoring of the INR.

SUMMARY

Paracetamol is the preferred painkiller for occasional use when taking warfarin.

If you take less than 5 tablets (5 x 500mg) of paracetamol per week, your INR is unlikely to be affected and you do not need additional INR tests.

If you take more than 5 tablets (5 x 500mg) of paracetamol per week, you may require additional INR tests. This is especially important if you take more than 4 tablets (4 x 500mg) of paracetamol per day for a few days. You should see your doctor to ask about having your INR initially checked one week after starting paracetamol.

If you have any unexplained bleeding or bruising when taking warfarin, tell your doctor immediately, whether you are taking other medicines or not.

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Recent and Upcoming Events

Still, on path of improving the quality of life, DML donated soccer kits and balls to five community soccer teams in Moshupa and surrounding villages of Polokwe, Marutlwe and Pyette. The event was held at Moshupa United grounds. The teams which benefited from these donations are; Moshupa United and Piano Masters all from Moshupa, Flying Birds from Letlhakane, Tsunami United from Polokwe/Marutlwe and Pyette United from Pyette village.

In welcoming the teams and the Diagnofirm management at the ceremony, Chairman of Moshupa United Mr. Thuto Keatweng said the soccer kits will go a long way encouraging their teams to perform to a higher standard. Also, the DML Managing Director pointed out that hopefully having the youth engaging in activities such as soccer will stop them falling into the temptation of crime and other ills that can put their lives in jeopardy.

Other recipients of DML's goodwill were pupils at Segoditshane Primary School in Gaborone. DML brought warmth to a possibly harsh winter to the underprivileged pupils of this school. Blankets were also donated to warm up the underprivileged in Ramotswa.

In other news, recently DML has uplifted its standards in the field of automation by acquiring machinery which is the latest not only in Botswana, but the whole of Africa. The recently installed Cell-Dyn Ruby is the first to be installed in Africa and you can read more about it later in the newsletter.

Interlude

A motorist had a flat tire in front of an insane asylum. He took the wheel off, but when he stood up he tipped over the hubcap containing the bolts, spilling them all down a sewer drain.

A patient, looking through the fence, suggested that the man take one bolt from the remaining three wheels to hold the fourth wheel in place until he could get to a service station.

The motorist thanked him profusely and said, "I don't know why you are in that place."

The patient said, "I'm in here for being crazy, not for being stupid."

Skin changes from varicose veins



INTRODUCTION

Skin changes in patients with varicose veins affect the lower legs, these changes are associated with poor circulation. The skin becomes dry and inflamed. It can affect middle aged to elderly people.

SYMPTOMS

The first sign is mild itchiness of the skin, just above the ankle, which then becomes speckled, scaly, inflamed and itchy and lesions may develop. If left untreated the skin all around the lower leg can become affected, it can also lead to the formation of ulcers.

CAUSES

The skin discolouration is caused by poor circulation in the legs. It is often preceded by the presence of varicose veins. These occur when the blood does not flow properly from the surface veins to the deep veins and pressure builds up in the surface veins, which results in blood pooling and venous insufficiency.

It is not understood why some people with varicose veins go on to develop varicose eczema and others do not.

DIAGNOSIS

The doctor will usually come to the diagnosis by looking at the areas affected. If in doubt, or you need further tests, you may be referred to a skin specialist.

TREATMENT

You can help to prevent and treat dry, scaly, itchy skin by the regular use of emollients (moisturisers). Emollients reduce water loss from the epidermis (outer layer) of your skin by covering it with a protective film. This keeps the water in the skin where it is needed and also helps to keep infections and other harsh substances out. Emollients are very safe and you cannot overuse them. They are not active drugs and do not get absorbed through the skin into the body.

You may need to use a topical corticosteroid (steroid) to treat inflamed

areas. You should talk to the doctor for further advice before using a topical steroid as they can sometimes make varicose eczema worse if the skin is broken, infected or ulcerated. The doctor may suggest that you

wear compression (support) hosiery or bandages to help the circulation in your legs.

If left untreated, the skin can break down, resulting in an ulcer. This requires treatment with special dressings and nursing care.

The way you use and apply the treatments is a key factor in how successful you will be in keeping the eczema under control. Failure of treatment can often be due to incorrect use. There are many preparations of each type of treatment. It may take time to find the best one (s). Do not try several new treatments at once for example, a mixture of creams, new diet and a herbal medicine, because if things improve, you will not know which treatment has worked.

Over the counter medicines are a range of emollient products can be bought from your pharmacy. Ask a pharmacist for advice on the different products and how to use them. After asking you a few questions to find out about you, your condition and any medicines you may take or use (including any treatments applied directly to the skin), they may decide it would be better for you to see the doctor to review your condition and its treatment. Be sure to mention to the pharmacist if the person who needs the treatment is allergic to peanuts because some products contain peanut (arachis) oil.

COMPLEMENTARY TREATMENTS

Evening primrose oil supplements, borage oil, homeopathy (graphites, nat.mur) and Chinese herbal medicine (Chinese gentian, Chinese wormwood, peony root, rehmannia) have all been used to treat atopic eczema. There is little evidence to prove how these alternative medicines work or how safe or effective many of them are. Certain herbs and preparations contain ingredients that can be harmful if not used with care or if not obtained from reputable sources.

Blood tubes and blood facts

These are some of the blood tubes used in a medical laboratory such as Diagnostics and the main tests for which they are used.



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Deep Vein Thrombosis (DVT), Long Haul Flights and Blood Tests

Deep vein thrombosis also called DVT for short occurs when a blood clot forms in a major vein, usually in the legs and/or pelvis (lower abdomen). The clot, which is produced when blood turns from a liquid to a solid state, forms in veins where blood flow is slow or has been disturbed.

The clot may block blood flow from the legs back to the heart, or a piece of the clot may be carried back through the heart and then lodge in a blood vessel, blocking its flow. Blood clots that travel to the lungs can affect the lungs ability to take in oxygen, this is called a pulmonary embolism and it can be fatal. However, it is possible to have a small deep vein thrombosis that won't be fatal or cause symptoms.

Deep vein thrombosis is quite rare and is most likely to occur after an operation or after long periods of inactivity. Hence the recent publicity about DVT and long haul flights.

WHO IS AT RISK?

Risks for DVT include prolonged sitting (such as on long plane or car trips) or bedrest. It also may be caused by recent surgery (especially hip, knee, or female reproductive organ surgery), fractures, childbirth within the last 6 months, and the use of medications such as estrogen and birth control pills.

Risks also include overproduction of red blood cells in bone marrow (polycythemia vera), cancerous (malignant) tumor, and having a condition in which the blood is more likely to clot (hypercoagulability).

Deep venous thrombosis is most common in adults over age 60, but it can occur in any age group.

WHY IS DEEP VEIN THROMBOSIS LINKED TO LONG HAUL FLIGHTS?

Deep vein thrombosis occurs when flying long distance because you are seated for long periods of time with limited opportunities to move around. You are also more likely to become dehydrated; dehydration can cause the blood to become thicker than usual. Deep vein thrombosis

can happen in other types of long journeys as well. When flying you should follow these guidelines set by British Airways:

- Drink plenty of non-alcoholic fluids.
- Avoid drinking alcohol and drinks with caffeine, such as tea and coffee.
- Avoid smoking.
- Stand up in your seat area and stretch your arms and legs.
- Get up and move around as often as you can (at least twice an hour).
- When sitting try moving your ankles around and going up and down on your tiptoes.
- Avoid sitting with your legs crossed
- Avoid wearing tight clothes especially, socks or tights that are too restrictive.
- Seek medical advice before travelling, if you have a previous history of deep vein thrombosis or you believe you might be at risk, such as being on coagulation treatment.

If you are at risk of deep vein thrombosis some doctors recommend you take an aspirin before you fly. This makes the blood less sticky and reduces the tendency for it to clot. You should also consider

wearing low compression socks, Scholl™ have recently launched special socks aimed at preventing deep vein thrombosis.

Can I do anything to prevent getting deep vein thrombosis?

To avoid getting deep vein thrombosis you should keep your weight down, avoid smoking and keep active. If you are over 35 and are still on the contraceptive pill, you should speak to your doctor about other forms of contraception as the risk of deep vein thrombosis increases with age.

If you are bedridden for long periods of time you should regularly flex your legs muscles, wiggle your toes and bend your ankles to keep the circulation in your legs active. If you are at risk of deep vein thrombosis you may be given drugs when having surgery to prevent the blood from thickening up.

LABORATORY DIAGNOSIS?

- D-dimer test
- Prothrombin Time
- Activated Partial Thrombin Time
- Fibrinogen

These test will rule out or confirm a diagnosis of DVT.

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Blood tubes and blood facts

BLOOD FACTS:

A person with type O blood can donate to anyone (universal donor), but can receive blood from a person with type O blood only.

A person with type AB blood can receive blood from anyone (universal recipient), but can donate blood only for others who have type AB blood.

A person with type A blood can donate blood for people with type A or type AB blood. A person with type A blood can receive blood from a person with type A or type O.

A person with type B blood can receive blood from a person with type B or type O. A person with type B blood can donate blood for persons with either type B or type AB blood.

Actually, blood banking is more complicated than this simple description, with test run for other minor compatibility antigens (like the MN antigen system) before transfusions are given.

Diseases Associated with Clotting Problems

To understand the possible disorders associated with the blood clotting (coagulation) system, consider the goal of the system: to prevent excess bleeding. If the clotting system cannot adequately form clots (thrombi), then the result is a bleeding disorder (hemophilia); if the clotting system forms clots too easily, then the result is formation of excess clots (thrombophilia).

PLATELET DISORDERS:

Platelet disorders occur when there are too few platelets, too many platelets or a normal number of platelets that do not function in the normal manner. Having too few platelets or platelets that do not function well (for example, aspirin use) can lead to a bleeding tendency (hemophilia). Likewise, too many platelets can predispose to a tendency to clot excessively (thrombophilia).

Platelet function can be altered in many different situations; many medications to treat diseases such as strokes and heart attacks were specifically designed to alter the ability of platelets to form clots. There are also a number of diseases that can alter how well a platelet can function.

COAGULATION CASCADE DISORDERS:

The second portion of the clotting system, the coagulation cascade, also has the potential to cause both an inability to form clots (hemophilia) and an excessive ability to form clots (thrombophilia). Hemophilic states result when there are decreased levels of the clotting factors. There are two primary disorders, hemophilia A and hemophilia B.

Hemophilia A results from low levels of factor VIII and hemophilia B results from low levels of factor IX. Low levels of virtually any of the factors in the Coagulation cascade will result in an inability to form blood clots; this will result in some degree of excess bleeding.

To understand the problems associated with excess clotting, consider the goal of the primary functions of blood in the body. Blood contains numerous cells and proteins and those components all have vital roles in the human body. However, the primary function of blood is to deliver oxygen throughout the body, which is

accomplished by red blood cells. Blood receives its oxygen supply from the lungs and is then transported from the heart in blood vessels called arteries to the rest of the body. Once the blood has delivered its oxygen, it is returned to the heart in blood vessels called veins.

ARTERIAL THROMBOTIC DISEASE:

Clots (thrombi) that form in arteries can limit and/or completely block the supply of blood (and thus oxygen) to a portion of the body. Lack of oxygen to a tissue is referred to as ischemia. Prolonged ischemia can lead to tissue death, referred to as infarction.

This process can occur anywhere in the body. For example, a heart attack (myocardial infarction) occurs when the blood flow that provides oxygen to the heart is blocked.

A stroke (cerebrovascular accident) occurs when the blood flow that provides oxygen to the brain is blocked. In both cases, there are numerous risk factors that can predict a susceptibility to these disorders. Many of these are not modifiable such as age and sex.

There are other risk factors that can be changed: smoking, obesity, inactive (sedentary) lifestyle, uncontrolled high blood pressure (hypertension) and uncontrolled high cholesterol (hyperlipidemia).

VENOUS THROMBOTIC DISEASE:

Clots that form in veins can block the flow of blood back to the heart. Again, these clots can form in veins throughout the body, but one of the most common places is in the deep veins of the legs. When a clot forms in one of these veins (called a deep vein thrombosis or DVT), it can cause redness, swelling, warmth and pain. Portions of this clot can break off from the main clot, becoming an embolus (an embolus is any foreign object traveling in the blood stream).

The embolus travels in the blood stream and can travel through the heart and into the lung, giving rise to a clot in the lung (pulmonary embolus). A pulmonary embolus blocks blood flow to the lungs, preventing adequate oxygenation of the blood. As with strokes

and heart attacks, pulmonary emboli can be small and asymptomatic or large and life-threatening.

Every year, approximately 250,000 patients develop a deep venous thrombosis (DVT's). Of these patients, between 30-50% develop a pulmonary embolus some of which can be fatal.

SECONDARY DISEASE STATES AFFECTING CLOTTING PROCESSES:

There are a number of diseases that can alter the clotting process; although these are not our main focus here, it is important to briefly mention a few as these can interact with other disorders, thus increasing the possibility of forming a clot. Many types of cancer, auto-immune diseases (for example lupus), post-operative states (especially following knee and hip surgery) and any condition which results in prolonged immobilization.

Thrombophilic states can increase the likelihood of clotting problems. However, even without any known thrombophilic state or risk factor, one can develop arterial and/or venous thrombi.

There are numerous factors and disorders that can predispose one to forming clots and it has been only recently that physicians and scientists have begun to understand such disorders.

It is quite likely that further disorders remain to be discovered which may provide further insight into how and why unwanted clots form and ultimately how they can be treated and/or prevented.

Interlude

Doctor: I have some bad news and some very bad news. Patient: Well, might as well give me the bad news first. Doctor: The lab called with your test results. They said you have 24 hours to live. Patient: 24 hours! That's terrible! What could be worse? What's the very bad news? Doctor: I've been trying to reach you since yesterday.



Patient (to cosmetic surgeon): Will it hurt, doctor? Surgeon: Only when you get my bill, Mrs Brown.

Meeting the Challenges of Diagnosis, Research and Development in Laboratory Practice:

A call for revaluation of professional practice from a public- private perspective.

“Man first of all exists, encounters himself surges up in the world and defines himself afterwards...he will be what he makes of himself. Thus there is no human nature ...man simply is. He is what he wills... man is free, man is freedom”

Richard Dawkins
The Selfish Gene

EXECUTIVE SUMMARY

- **Context**

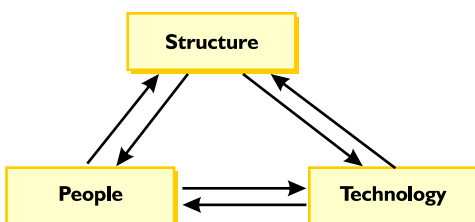
The paper seeks to highlight challenges faced by the healthcare sector in general and the medical laboratory in particular and proposes how those challenges can be met and or turned into opportunities for the growth and development of laboratory practice in the country.

- **Setting**

“The mark of an organisation is how it reacts to a crisis”

BACKGROUND

The 27th edition of the Botswana Review of Commerce and Industry 2007 identifies the HIV/AIDS pandemic and Human Resources shortages (both quality and quantity) as the main challenges to the health sector in the country with about 20% of the current total government development expenditure meant for healthcare development. [1] Given the huge financial commitment and that as a developing country the challenges of providing quality health services to a growing population remain enormous an in depth analysis and review of the available structure, resources and technologies from both the public and private perspectives is necessary to identify gaps in policy formulations, interpretations and implementation, service delivery, accessibility ,quality and how maximum health benefits can be derived from what is available.



INTRODUCTION

In addition to the challenges alluded to in the background section of this paper laboratory practice is faced with additional identified challenges which include: demand for services exceeding provider capacity, insufficient physical infrastructure and under equipped care provider facilities, supply chain management(reagent and consumables), professional practice or lack of it, poor and weak decision making systems(lack of leadership and advocacy),strategic planning(budgetary concerns),national laboratory policy, lack of feedback, viewing of private sector as competitors rather than partners, career path and retention of staff, remuneration differences and skewed promotion procedures implying varying commitments to change/work, quality management systems.[1,2,3] These challenges have resulted in inadequate laboratory systems to support the implementation and uptake of health programmes.

Fig. 1 below summarizes these all these challenges for the purposes of this paper

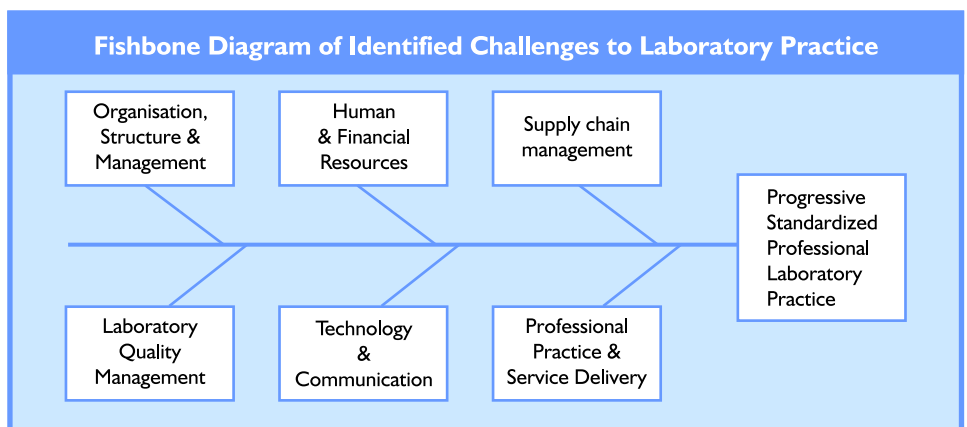
Organisation, Structure and Management

Human beings construct administrative structures for specific purposes. These administrative structures together with policy provisions, organizational structures, management and control strategies contribute to a process of laboratory service provision. We need to explore how far the existing administrative structures enable our set objectives as the medical laboratory to be achieved and how far they militate towards the realization of our goals.

Any dysfunctional organisation structure through wrong arrangements among the parties involved in service delivery results in low productivity of staff, under-utilisation of institutions and resource misadministration which is evidently one of our major challenges as a service sector.

How is our operational laboratory organizational structure with regard to inclusiveness, clarity and regulated reporting formats?

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“Every process, every structure, every concept, every activity today can be challenged indeed must be challenged and most probably changed”

Open Nights





Lab Manager



Minister Baledzi Gaolathe & Mr. Chand

DIAGNOFIRM

Official



Managing Director, M.I. Chand gives his speech



M.I. Chand with Indian High Commissioner



Diagnofirm staff



Minister Motsumi cuts the ribbon as Samantha looks on



Minister Motsumi and Gomolemo Motswaledi



Lab Manager D. Mhlaba



Ministry of Health Permanent Secretary, Mr Kahiya



Witness illustrates a point to the invited guests



Part of the DML

DML DIAGNOFIRM Opening



Emang explaining the HIV monitoring department



Tapiwa explains to the dignitaries the functions of the Haematology Lab



Staff strike a pose



Minister Motsumi gives keynote speech



Manyana Village Choir



Man gives the vote of thanks



Rita discusses the finer points of CD4 Monitoring



Minister Motsumi, Former President Mogae and DML Consultant Dr. Ritalin



Phlebotomy staff



Part of the front office staff



Mr. & Mrs Chand Senior

diagnofim
supports the communities
(soccer kit donation)



Installation of New Machinery



Pregnancy

Pregnancy is the period of time when a fetus develops inside a woman's uterus and ends with the birth of the infant. Pregnancies typically involve a variety of clinical laboratory tests. The tests provide useful information from the time pregnancy is first considered through the initial days of the newborn's life. Some of these tests are performed at specified times throughout the pregnancy.

Others are ordered as needed to detect and address conditions or problems that arise during pregnancy. Still others are offered to women who have increased risks because of their age or lifestyle and, finally, certain tests are selectively chosen based on the personal and family medical histories of the woman and her partner.

The purposes of prenatal tests are to screen for and diagnose any existing problems that may affect the mother's or baby's health, identify and address problems as they arise, and assess the risk of a baby having a chromosomal or genetic abnormality.

These tests may be offered based on the mother's age, history, or ethnic background. The tests generally require just a small sample of easily obtained blood, urine, or cervical cells. Some tests will be done more than once, and it is always good for pregnant women to clarify any concerns they might have with their doctor.

All of the following tests are routine, but they play an important role in protecting the health of the mother and the baby. A healthcare provider may check the urine at each prenatal visit. The blood test for anemia will be performed at least once more during the pregnancy.

TESTING ASSOCIATED WITH HEALTH CONDITIONS OF THE MOTHER THAT AFFECT PREGNANCY

Immunity to rubella (German measles):

Checks for immunity to the Rubella virus, which can cause birth defects. If one has had this infection before, they are not likely to get it again. If you have not had it, while you are pregnant avoid anyone who has the disease. A vaccine for rubella is available, but it is best not to get it during pregnancy. If the blood test shows you are not immune, you should get the vaccine after the baby is born.

Human immunodeficiency virus (HIV) antibody test:

Check for HIV infection so steps can be taken to reduce likelihood of transmission to the baby. HIV is a virus that attacks certain cells of the body's immune system and causes AIDS (acquired immunodeficiency syndrome). If you have HIV, there is a chance you could pass it to your baby. While you are pregnant you can be given medication to help reduce this risk.

Gonorrhea, chlamydia, and syphilis tests:

Check for STD infections, which can cause miscarriage or infect the baby during delivery. These are treatable diseases if one is found infected. But if left unabated they can cause major health problems for the baby if he/she is infected.

Hepatitis B screening:

To detect Hepatitis B infection. This virus infects the liver. If a mother has it they can pass it to their baby. After the baby is born, the mother may be given a drug to help treat the virus. The baby will then be given the same medication and a vaccine against the virus after birth.

Varicella zoster viral testing:

To check for immunity to chicken pox and herpes zoster, and this can cause birth defects. Varicella-zoster virus can cause a distinct congenital syndrome, a potentially fatal neonatal infection and life-threatening maternal illness. Physicians can reduce morbidity from these conditions by advising non-immune pregnant women to avoid exposure to chickenpox and herpes zoster and, when indicated, by promptly administering varicella-zoster immune globulin.

TORCH panel.

The blood tests that make up the panel are for Toxoplasmosis, Other infections (syphilis, hepatitis B, coxsackie virus, Epstein-Barr virus, varicella-zoster virus, and human parvovirus), Rubella, Cytomegalovirus (CMV), and Herpes simplex virus (HSV): This panel is used to check for infection with toxoplasmosis and other infectious diseases that can cause birth defects

Bacterial vaginosis and Urine culture for bacteriuria:

Detect infection, which can cause pre-term labor and birth or bacterial infection in the urinary tract, which can lead to kidney infection or also an increased risk of pre-term delivery and low birth weight.

Group B streptococcus:

This is normally done between weeks 35 and 37 of pregnancy to detect infection, which can harm the baby during birth and infect the mother's uterus, urinary tract, and any incision made during a cesarean section.

DETECTION OF FETAL ABNORMALITIES OR RISK

Birth defects may affect the baby's health, or his or her ability to function. Some defects can be prevented, and many can be treated or corrected with medication or surgery.

Some birth defects are passed from parent to child. In many cases, the reason for a defect is not known.

Before or during pregnancy, some tests are offered to check the parents' risk for having a baby with certain defects. The results of these tests, along with genetic counseling, will let parents know about their risk of having a baby with a problem.

The possible defects are:

- Neural tube defects: Birth defects that result from incomplete development of the brain, spinal cord, or their coverings.
- Down syndrome: A genetic disorder in which mental retardation, abnormal features of the face and medical problems such as heart defects occur.
- Chromosome defects

First trimester Down syndrome screen:

This test is usually done between 10 weeks, 4 days and 13 weeks, 6 days of pregnancy. It is done to assess risk of a mother carrying a

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Diagnofirm has recently introduced a new automated, mid-volume hematology instrument, the CELL-DYN Ruby™. With its advanced laser optics, this instrument offers enhanced cellular analysis and greater efficiency for performing full blood counts (FBCs), a test routinely ordered by doctors to assess a patient's overall health and to screen for a variety of disorders such as anemia and infection.

A key facet of CELL-DYN Ruby is its use of laser light to differentiate cellular components. Known as Multi-Angle Polarized Scatter Separation (MAPSS™), this all-optical technology provides detailed results in easy-to-view diagrams, visually depicting changes in white blood cells, red blood cells and platelets. CELL-DYN Ruby also underwent a multi-center medical evaluation showing clinically equivalent results with CELL-DYN Sapphire™, a higher-volume, automated analyzer.

To streamline inventory and simplify laboratory operations, CELL-DYN Ruby only requires four reagents. Additionally, the instrument utilizes advanced yet intuitive software with online tutorials to help facilitate training.

In time we hope this hematology instrument which is becoming well known for its efficiency and ability to provide fast access to patient results will prove itself handy to our doctors and patients. Besides supplying standard FBC results, this instrument has additional features to aid in the evaluation of more complex disease states or infections including cancer, HIV and a variety of anemias. It also has a features top flag any malaria infections. Meaning, if a patient is infected with malaria but the test has not been requested, the machine when doing a routine FBC will flag for a possible malaria infection. This can then be confirmed with microscopy. The Ruby therefore offers a screening for malaria infection.

Also recently acquired by DML is the Abbot Architect ci8200 analyser. The ARCHITECT ci8200 is an integrated chemistry/immunoassay platform delivering high throughput and fast turnaround times for improved lab workflow and maximum operator productivity.

The analyser has a uniquely engineered

Robotic Sample Handler that ensures that samples are prioritized and can be tested at any time. This means fast turnaround times and ensures doctor and patient satisfaction even during peak workload hours.

Its technological features are as such:

- Throughput of up to 1,200 clinical chemistry and 200 immunoassay tests per hour enhances workflow
- Large onboard reagent capacity of 25 immunoassays and 68 chemistries reduces operator intervention and minimizes sample splitting.
- Sample loading of up to 367 samples via priority (35), routine (300), and carousel (32) areas provides continuous sample access
- Calibrator and quality control materials can be run via the RSH or sample carousel, providing additional loading flexibility
- Clot detection utilizing pressure differential technology ensures accurate sampling
- Extensive calibration and reagent stability reduce reagent usage and operator hands-on time
- Levy-Jennings QC tracking for up to 35,000 QC points
- Intuitive indicator lights assist the operator in assessing sample status at a glance
- Large onboard consumable and buffer supplies provide 5-hour walkaway time
- Touch screen interface with icon-driven, easy-to-navigate software
- Less than 3 seconds screen response time and a maximum of 2 layers to execute a task
- On-line operator manuals, on-line help, automatically updated maintenance logs, and computer-based training.
- We at DML hope this improvement in machinisation shall be felt by improved service on our part.

Laboratory automation is a multi-disciplinary strategy to research, develop, optimize and capitalize on technologies in the laboratories that enable new and improved processes.

The application of technology in today's laboratories is required to achieve timely progress and remain competitive.

Automation is a critical component in the progress and evolution of any medical laboratory. But automating a laboratory and all of its processes is not simply a matter of plugging in a few machines and watching samples line up for testing. Managements need to know what automation entails and how it fits in with their circumstances.

Because of the complexities inherent in the automation process, an explanation of those and a "how-to list" for the preparation of, transition to, and implementation of an automation line has to be followed.

WHY AUTOMATE?

The automated processing of specimens provides clinical laboratories with many benefits, including: increased efficiency by processing more samples than laboratorians could accomplish in the same amount of time; decreased risk of manual errors due to incorrect identification or processing of tubes, miscommunication, fatigue, etc.; improved worker safety by limiting repetitive motions and exposure to biohazardous materials; and lowered labor cost by reducing the number of personnel needed to do the job.

Most laboratory managements understand why automation is vital for confronting the challenges that lie ahead and recognize the importance of result output in the field of medicine.

With this in mind it might bring about a revolution in sample handling and result output which will herald a new era of laboratory medicine.

Challenges of Diagnosis, Research & Development

The absence of specific presentation of the medical laboratory in the planning, operational structures, management and decision making processes within the Ministry of Health makes it unknowingly impossible to deliver the expected service in any environment. Furthermore there is no consensus definition on the minimum capacities that laboratory departments in any sector, government, research, mission, private, NGO need to conduct work and most importantly implement quality management systems.

Laboratory Quality Management Systems

The importance of quality in the functioning of healthcare laboratories is well recognized globally and more importantly in developing countries such as ours. The poor quality of laboratory results can lead to inappropriate interventions, adversely affecting the credibility of the laboratory and may also invite legal action notwithstanding the huge financial costs of those interventions. There has been development and implementation of policies on quality in medical laboratories, internationally the ISO15189 quality system assesses specific aspects of healthcare laboratories. Nationally the Department of Technical Services through the Department of Medical Laboratory Services published in 2003 the Botswana Medical Laboratory Practice Standards which envisages "...cooperation between medical laboratories in Botswana promoting exchange of information, sharing experiences and harmonization of technologies." [4]

Regardless of the presence of the above guiding tools the current modus operandi is that specialized laboratory services including public and private diagnostic and research laboratories and different geographic settings have developed their own quality systems which has led to disparate policies and little or no coordination. How much cooperation in terms of data and experience sharing is occurring on the ground? Do we have the necessary structures and platforms?

When implemented LQMS provide assurance to laboratory clients, effects maximum cost effective usage of available resources and allows assessment and comparison of reliability of laboratory

performance on a national scale leading to identification of common errors. Also through monitoring and auditing elements of LQMS there is encouragement of usage of uniform procedures and standard reagents. [5] Administrative action can be taken by government as the regulating authority and custodian of all health programs nationally against substandard laboratories stimulating the implementation of internal quality control measures which are the bedrock of any LQMS.

"Resources can never be enough; neither can be the health gains"

Financial and Human Resources

Botswana backed by a stable democracy, economy and multiple technical, development and implementing partners has managed to commit huge **financial resources** to the health sector and the medical laboratory has been a huge beneficiary. Although not enough the laboratory as a sector as an organisation must meet its financial challenges and greater cost effectiveness through rationalization by elimination of unused capacity, avoiding unnecessary services and ensuring more efficient use of skilled staff and expensive equipment. [6]

The Botswana National Health policy stresses that the staffing of health service (**Human resources**) must be adequate, equitable and efficient. Adequacy is a global commodity of concern but equity and efficiency can and should be achieved locally. The first global forum on human resources for health met in Kampala Uganda in March of 2008 and agreed that health workforce shortages can not be left to individual countries and that there is need to scale up investments in the workforce coupled with the creation of the necessary policy space for effective action where multiple stakeholders pull together guided by evidence, innovation, solidarity and mutual accountability. [7]

Six (6) strategies were adopted for action at the forum with the following: scaling up health worker education (pre-service) and training (in house) and retaining an effective and equitably distributed workforce being more immediately applicable and in line with our current policy and strategic direction. Our human resources focus should not

only include training and retention but also professional practice and service delivery.

Professional Practice and Service Delivery

Buches and Struss define a profession as and I quote "a relatively homogenous community whose members share identity, values and definitions of roles and interest". [8]

Our image as professionals has been reported as dependant on the role image that the individual practitioner projects. This then influences the image held by the public, other professionals in the field and members of the profession itself. How then are we projecting ourselves in the eyes of our clients and colleagues? Does the definition above apply to us as medical laboratory personnel? Given the wide variety of academic training and practice backgrounds of the staff in medical laboratories in this country do we have a professional practice criterion to guide us and emphasize on accountability and ethics?

Kim Best in her article "Professional Associations are vital partners" talks about the lack of provider motivation in the absence of professional associations resulting in minimum implementation limiting the implementation of policy decisions (service delivery).

Government has acknowledged the constraints of service delivery in the public sector and the private sector is not immune. Supply chain management of reagents and consumables is the greatest threat to service delivery in the medical laboratory together with equipment downtimes.

Supply chain management

The bulk of the reagents and consumables used in the medical laboratory are imported via South Africa meaning most suppliers are based in South Africa with their local agents and or representatives not custodians of much inventory. This is a huge challenge to service delivery and coupled with unfriendly procurement procedures and weak logistical arrangements the turn around times of laboratory work in all service sectors is heavy compromised. Can harmonization of

technologies be the panacea to our supply chain management challenges?

Technology and Communication

Christopher Bailey a scientist with the Evidence and Information Department of the World Health Organisation in his contribution to the Public Health Journal said "...Where people are dying of HIV/AIDS, tuberculosis, malaria despite the availability of technologies to control them it is partly because the procedures for using those technologies effectively have not been worked out and learnt locally". [9] The sole purpose of technology is to make life simple for the people.

In light of globalization we unfortunately have an inherent limitation of a low technology status. A challenge that limits access to information and communication and the gap between the developed world and us given our multiple partnership in health can thus be bridged quickly through "technology diffusions" and "technology jumps". As the medical laboratory our systems have a lot in common in terms of problems, policies, manpower shortages and economic challenges.

Legislation procedures and regulatory instruments can facilitate the regulation, validation and approval for use of technologies for use in the medical laboratory?

The active participation of those who know the local environment is critical in translating such technology into practice. LIMS and equipment and method selection must be defined and regulated across the service sectors. [4] The healthcare delivery system has evolved because technology in general and the clinical laboratory in particular provides information which impacts on the diagnostic and therapeutic decisions necessary to be cost effective and patient appropriate.[10]

"Information is giving out Communication is getting through"

Communication reportedly the basis of all human relationships is a decisive factor in the health delivery service with regard to provision of a safe and working environment. For the medical laboratory to

raise standards of practice, meet and exceed customer perceptions of quality service regular communication is necessary and must involve partners and colleagues at all levels when developing and setting standards. Regular briefings are essential and the only way to prevent leakages of information from the policy making committees is to make available the information to all concerned on any plans that might have a bearing on their careers, working practices and well being.

Recommendations: Meeting the challenges

Charles Darwin said and I quote "Facts have no meaning in themselves until they are collected and presented for or against some hypothesis" I therefore make the following recommendations for the "hypothesis" of Meeting the challenges of diagnosis, research and development in laboratory practice.

Total quality policy pays attention to the **human, structural and technological** aspects and that a neglect of any one of these areas results in a deficient quality system. Increased resource availability is only and will only be a success in so far as it leads to improvements in coverage, utilization and quality. Technical, implementing and development partners must also consider also" linking health sector investments and strategies to macroeconomic dialogue particularly in health staffing and civil service reform"

Staffing (**Human Resources**) is not only to do with but also competence, skills and orientation. There is need to continuously develop our human resources base in light of the insurgent brain drain and technological onslaught. Strategies for HRM include clearly defined career progression and retention of staff, enhancing career pathways, bottom to top education, and access to extended roles and consultant roles for staff. Staff with the same basic education should be moved around departments to create passionate, flexible empowered employees with a quest for success and who can make decisions that can improve the process using the *Attitude, Principles and Responsibility (APR-Approach)*. [11]

Continuous professional development when made mandatory or a prerequisite

for certification/accreditation can be the most cost effective form of training and learning should be systematic enabling practising professionals to be brought up to date on the developments of their profession.

We should also put our efforts in validating principles of professional practice criteria through a professional practice advisory board or related structures. The board's composition will include public, academic, research, private, industry, public and private practicing professionals. Their responsibilities might include the following among others: review and advice on **structure** and content of training programme, identifying continuing education needs of professionals, providing liaison between training department and practicing professionals at all levels, identifying and assisting in the establishment of relevant empiric and operational research programmes. Laboratory personnel should become "persuasive advocates who maintain and defend issues and proposals to improve the status of their laboratories" [10]

Opportunities for change are now almost unlimited and provided they are grasped firmly and completely exciting times lie ahead for the profession. Attributes of good service delivery include ability to work as a team and to network given the global drive towards integrated health system delivery.

Even though we might see ourselves in a certain way other people often see us completely differently. The network approach increases opportunities for "sub specialization", professional support and cross over, reducing the risk of "professional isolation" Our professional associations we fully utilized facilitate the development of education, administration harmonization of technology and standards of practice as well as the development of the socio-economic status of the medical laboratory personnel.

"What gets measured is what gets managed"

We need continuous establishment ,review and update of medical laboratory work content under work measurement and use the results for scheduling, loading, line balancing, establishing manning levels, efficiency comparisons of alternative methods, estimating future costs, workloads and financial schemes.

In Brief...

The structural aspect of total quality policy should result in exploration of all inclusive regulated medical laboratory practice S Kuhn reports that the practice of the medical laboratory discipline emerged as a result of scientific revolution parallel to a political revolution and these occur because the existing institutions are models of thought that have ceased to provide an adequate framework for the exploration of nature. [11]

Benchmarking technological aspects has become a standard for establishing performance objectives as it is a continuous process of measuring service and business practice against the toughest competition and those recognized as market leaders. The benefits of research and private sector experiences should assist the public sector to acceptable quality of service. The most efficient quality system is a unique, personalized system, created by the staff concerned, in which all individuals are conscious of their responsibilities and driven by team spirit towards good working practice.[5]

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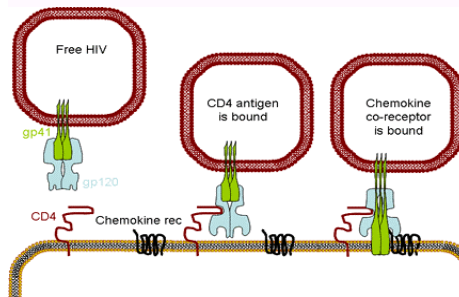
This section is intended to break down in simple language the basics of some of the medical concepts one hears about so often but of which one may have little or no understanding.

For instance, you may have heard someone say of another who has been taken ill that the reason for his ailment is that his CD4 count is very low. Many peoples' understanding of this term doesn't extend beyond knowing that this is not a good thing. They may not have an understanding of what is being counted or why it would be low in someone with a long-term HIV infection.

This leads us to our first question:

What is a CD4 count and what is its significance with respect to HIV infection?

Lymphocytes are group of cells that are a subset of white blood cells. They are



classified as B lymphocytes and T lymphocytes. CD4 cell count refers to the number of T lymphocytes which are CD4 positive that are present in a person's blood. CD4 is the name of a type of receptor molecule present on the surface of a particular type of T lymphocyte which distinguishes it from other lymphocytes. CD stands for cluster determinant/cluster of differentiation. The Human Immunodeficiency Virus (HIV) has a molecule present on its surface called gp120 ('gp' refers to the glycoprotein structure and '120' refers to its size or molecular weight). CD4 molecules have a strong affinity for the gp120 molecule. This means HIV gp120 molecules are bound to the surface of the T cell by CD4 molecules which allows the virus to breach the membrane of the CD4 positive T cell.

Once inside, the virus forms many copies of itself. The newly formed virus particles destroy the T cell causing them to be released back into the blood where they bind to attach to, invade and destroy more CD4 positive T cells.

The decrease in the number of T cells means that the immune system is compromised. At this point the immune system is not able to fight off infection as effectively and efficiently as before, thus opportunistic infections are able to take hold.

Interlude

In the maternity ward of a hospital, new-born girl baby looks over at new-born boy baby and asks, "Are you a girl baby or a boy baby?"

The boy baby quickly chirps up, "I'm a boy baby!"

"How can you tell?" asks girl baby.

"Easy," says boy baby. And, with that, he threw off the blankets, hoisted up his itty-bitty night-shirt and proudly pointed downward. "See.....blue booties"



Two old men were arguing the merits of their doctors. The first one said, "I don't trust your fancy doctor. He treated old Jake Waxman for a kidney ailment for nearly a year, and then Jake died of a liver ailment."

"So what makes you think your doctor is any better?" asked his friend.

"Because when my doctor treats you for a kidney ailment, you can be sure you'll die of a kidney ailment."

Pregnancy

fetus with certain chromosomal abnormalities, such as Down syndrome.

The requirements for this test are the mother's blood and plus an ultra-sound scan.

MONITORING OF PREGNANCY

Urine screen for sugar and/or protein: Check for signs of kidney or bladder infection, gestational diabetes, or preeclampsia. Although the presence of sugar in the urine is normal in pregnancy, high levels could be a sign of diabetes. Protein in the urine may be a sign of a urinary tract infection, kidney disease, or high blood pressure that occurs in late pregnancy. The urine test also is used to check for infections of the bladder and kidneys. If these problems occur, they can be treated.

Hemoglobin test:

Used to check for anemia. If low levels of iron are found, the mother may be given supplements to increase them.

Platelet count:

Used to detect a low count or other platelet problem; platelets are important for blood clotting in case of bleeding during delivery.

Blood type and antibody screen:

Used to check for potential incompatibility in blood type between mother and fetus (such as Rh factor antibodies). Your blood type can be A, B, AB, or O. It can be Rh positive or Rh negative. If your blood lacks the **Rh antigen**, it is Rh negative. If it has the antigen, it is Rh positive.

Problems can arise when the baby's blood has the Rh factor and the mother's does not. The mother's body may react as if it were allergic to the fetus. It can make antibodies that attack the baby's blood. This can cause the baby to be anemic (have low iron levels) and requires special care during pregnancy.

Oral glucose tolerance test:

A test to check for gestational diabetes.

Food Poisoning

Food poisoning is a health hazard that needs to be prevented than cured. Studies have shown that 80 % of food poisoning is caused by bacteria hence the main focus of this paper.

Knowing the characteristics of bacteria and their mechanism of action plays an important role in identification and dealing with food borne illness. This information will help in fast identification of the causative organism and guides in prescribing medical intervention that are necessary.

Food poisoning can occur as a result of ingestion of toxins that were produced by microbes or by ingestion of bacteria that have contaminated the food.

It has been found that food poisoning mostly affects children, old people and the immune-compromised people. This is because these people do not have a strong immune system which can handle some of these infections.

Some of the common signs and symptoms of food poisoning are vomiting and diarrhea. These can occur immediately or several hours after eating contaminated foods. Most of these symptoms are self limiting in healthy individuals.

Laboratories play an important role in prevention of infection by carrying out tests on food handlers.

In Diagnofirm we do the following tests: widal test, stool culture to detect salmonella and Shigella, culture swabs from nose to detect Staphylococcus aureus, ZN staining for sputum samples to detect mycobacterium tuberculosis. The basic aim is to detect, treat and provide continuing education on how to reduce the number of food poison causing bacteria in food outlets.

PREVENTION AND RECOMMENDATIONS

Unfortunately laboratories are only involved with food handlers when they are sent by food outlets for testing. This is not enough since causative agents might be left behind in working surfaces, kitchen utensils and storage facilities.

We believe that in addition to testing and encouraging proper personal hygiene, food handlers should also be educated about the use of disinfectants. The success

of disinfectants depends on its careful use under appropriate conditions of concentration, duration of exposure, temperature, pH and absence of neutralizing substances. In addition disinfectants should be bought from an approved and accredited manufacturer and instructions of use should be followed as the manufacturer recommends.

We believe that it is better to prevent food poisoning than to cure it. In order to achieve this we feel that the laboratory should be involved not only with food handlers but samples should also be taken from working surfaces, utensils and storage facilities. Food outlets inspectors should be given the authority to do random visits without appointments to see if their recommendations are implemented.

Let us all bear in mind that food is necessary as it provides nutrients for the body but if not handled properly it can be disastrous.

Interlude

Chico once went to the doctor due to stomach trouble. The doctor prescribed plenty of milk and gave Chico a bottle of pills. "I'll stop by this evening and see how you're doing," the doctor said. "In the meantime, drink at least four glasses of milk. Milk is the ticket for curing your trouble. So drink plenty of it." That evening, the doctor returned, examined Chico and told him, "You're much better this evening. Just be sure you don't drink any milk. Not one glass. It's not for you." "But, doctor," Chico exclaimed, "only this morning you told me that milk was what I needed and that I should drink four glasses of it." "Well, what do you know?" the doctor replied. "It certainly goes to show that we've made tremendous progress in medicine since the last time I saw you."