

# Metrology in the Health sector-a practical approach

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## Definitions:

- Metrology, the science of measurement is often overlooked when dealing with health and yet it is one of the most critical elements of Primary health care.

## Definitions:

- Calibration:

*Calibration is defined as 'a set of operations that establish, under specified conditions, the relationship between the values of quantities indicated by a measuring instrument or measuring system ... and the corresponding values realized by standards'.*

(BIPM definition)

## Definitions:

- Verification

*Verification is defined as 'a set of operations that establish whether a measurement is within the required Tolerances.'*

## Definitions:

- **Primary health care**, often abbreviated as PHC(Primary Health Centre) and PC, is "essential health care based on **practical, scientifically sound and socially acceptable methods** and technology made universally accessible to **individuals and families in the community through their full participation and at a cost that the community and the country can afford to maintain at every stage of their development** in the spirit of self-determination"[1] (Alma Ata international conference definition).

## Definitions:

- In Uganda, Primary health care includes Reproductive health care, preventive health care (immunization) and disease treatment health care.

# Case Study: Uganda

- Uganda is divided into 80 districts and at each district there is a District Directorate of Health services which oversees the running of Health centers in the district, the supply of equipment, supply and storage of vaccines, carries out disease surveillance and ensures that safe medical practices are carried out in the district.
- In all the health centers in the 80 districts of Uganda, the following Measurements are carried out;
- Body Temperature measurements.
- Blood pressure measurements.
- Body weight measurements.
- Volume Laboratory test measurements.
- Body Height measurements.

# Case study: Uganda

- In addition, all drugs are supposed to be kept under specified temperature conditions and in case these storage conditions are not adhered to, the drugs become less effective or useless in the case of vaccines, they are known to lose their potency.
- **Measurements (temperature, pressure, mass and volume) are critical for disease diagnosis, drug prescription and administration and therefore Metrology is a core part of primary health care.**

# Our Dilemma

- The Question however, is whether these measurements are accurate and dependable especially, since **a person's life** can either be **lost or saved** on the basis of such a measurement.
- This however, has not been taken seriously in many developing countries.

# Is the Measuring tape Accurate???

The circumference of a child's head being measured.



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## Case study: Uganda

- In the case of Uganda, out of all the government funded health units, none has ever carried out the calibration or verification of their measuring instruments to find out if their readings are correct.
- This obviously has an impact on the quality of health care in the country.

# Importance of Accurate measurements in the Health sector

- Imagine a situation where a patient suffering from malaria visits a health facility and the Body temperature is taken with an inaccurate thermometer with an error of 3°C below, a temperature of 40 °C can easily be read as 37 °C and this could lead to improper diagnosis and treatment.

# Importance of Accurate measurements in the Health sector

- Imagine another scenario where vaccines like Oral Polio Vaccine(OPV) which is normally kept at  $-20\text{ }^{\circ}\text{C}$  is left in a refrigerator for a weekend and on Monday morning the health worker comes to take temperature readings with a faulty thermometer. It may indicate that the vaccines are still potent whereas they lost their potency a week ago. So immunizing your child with this drug may instead expose your child to risk or even reaction leading to death.

# Importance of Accurate measurements in the Health sector

- Imagine a scenario where a certain drug is administered according to the body weight of an individual.

A weighing scale with an error can cause a patient to be given a wrong dose leading to fatal consequences

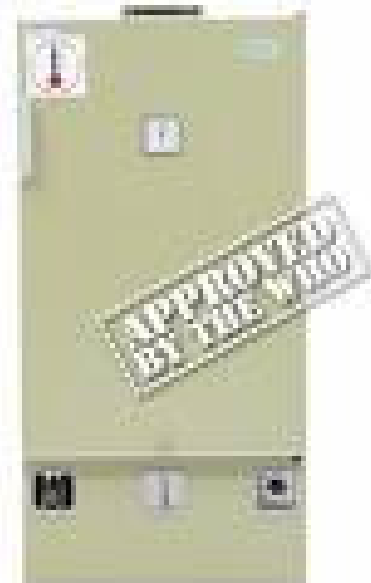
What about monitoring the weight of a new born baby????

# Importance of Accurate measurements in the Health sector

- Most of the other vaccines for example BCG (Tuberculosis vaccine), Hepatitis B, Tetanus Toxoid and Measles vaccine are recommended to be kept between 2 °C and 8 °C.

# Is the reading on the Vaccine fridge accurate????

- A vaccine fridge, SIBIR type commonly used in Uganda.



# Attempts to prevent risks

- There have been attempts to ensure that these temperature ranges are supervised by attaching Vaccine vial monitors(which change color outside the required temperature range) on their vials although in most cases wrong temperature readings on the refrigerators have caused loss of vaccine and yet they are very expensive.

# Vaccine Vial monitors

- Vaccine vial monitors used to monitor temperature changes to determine vaccine life



# Importance of Accurate measurements in the Health sector

- Accurate measurements are also critical in Antenatal health care (during and after Pregnancy) especially in body weight measurements, Drug administration and monitoring of growth of the new born baby (size of the head, etc..). **This is considered important in health and yet no one has bothered to find out if the weighing scale that has served in a health center for even 10 years is still accurate.**

# Our Main Challenge

- **The responsibility of ensuring that the community is protected against the above risks of improper treatment lies on the government through its standards institutions and yet we have continued to do nothing about this grave situation.**

# Our Main Challenge

- **It is the duty of standards institutions to ensure that Measurements in the Health sector are precise, accurate, dependable and are disseminated to the community.**



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## Let us consider that;

- A chain is only as strong as its weakest link.

And so;

A Nation is only as strong as its health care system.

# Problems cited in this struggle

- Lack of adequate equipment for ensuring that standards Units are disseminated to the health facilities. This includes calibration equipment, standards, vehicles, etc..

# Problems cited in this struggle

- Lack of funds for carrying out outreaches to the health centers. This is very important because the beneficiaries of these services include poor people in the rural setting who can not afford to pay for these services therefore it is incumbent upon the government to ensure that standardization is implemented so as to protect its citizens.

# Problems cited in this struggle

- Lack of staffing levels to ensure that such activities are undertaken because this includes traveling throughout the entire country which means many people would have to be employed purposely to carry out these activities.

# Problems cited in this struggle

- Lack of a culture of sustainability of health initiatives. This can clearly be seen when you imagine that all this measuring equipment was distributed to various health facilities but little or no effort has been made to verify if they are working properly.

# Problems cited in this struggle

- Lack of information regarding standardization and its relevance to the health sector.

# Problems cited in this struggle

- Lack of Medical personnel in the Standards institutions.

## 2 Questions to ask your neighbor

How many Medical practitioners do we have in our organizations?

Are we competent enough to talk about Standardization in health without them?



**One Simple answer**

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**NO**

# Solution to the problem

- Please recruit at least one medical officer to assist in this area.



# Three simple questions

- What is the cost of one person's life??????
- Why do we bother to talk about the growth of a nation when the people's lives hang on a thin thread of a faulty thermometer, blood pressure machine or Scale???
- For the politicians : where will those votes that you look for come from when the death toll keeps on increasing???

# Problems cited in this struggle

- These and many other challenges have caused the failure of standardization in the health sector.

The burden is upon all who care about the community to ensure that this noble initiative starts and is supported.

**LET US NOT BE PART OF THE PROBLEM**

# Proposed Solutions

- The government should be requested to purchase mobile calibration equipment which can be operated on Solar power for example; a portable solar system with an inverter can be very useful in the country side where there is no electricity supply.

# Proposed Solutions

- The government and the various stakeholders in primary health care such as World Health Organization and UNICEF should ensure that when equipment is supplied, there is a maintenance plan and among the issues included should be the need to ensure that proper standardization policies are maintained including periodic calibration of equipment.

# Proposed Solutions

- There should be an effort to educate the community and all health stakeholders about standards and their relevance to the health field.

# Proposed Solutions

- The policy of standards institutions carrying out such activities at a cost should be eliminated if this initiative is to deliver results. This is because the monthly budgets of individual health centers is very small with some of them running at budgets of as low as 120,000 Uganda Shillings (70.5 USD) and most of this money is spent on transport of staff, kerosene for sterilization, detergents and payment of casual labour.

# Proposed Solutions

- The government should strengthen support to Standards institutions to enable them recruit more staff, carry out relevant training and equip them thoroughly so that the struggle to include standardization in the health field can be strengthened

# Proposed Solutions

- Standards institutions should consider it important to have departments concerned with Health issues and should recruit health personnel to provide technical knowledge in health related issues.

# Proposal Statement

- The proposal is therefore for the government to fund these activities and ensure that the population is protected against inaccurate measurements in the health sector. This will lead to a more productive population and will reduce on indicators such as Infant mortality rates and Antenatal deaths which are used to evaluate Primary Health care in any country.

## Conclusion:

- There may be pleas of under funding on the parts of our governments but the real question is how much have we done with the little we have in this area???

## Conclusion:

- **Let us as standards Institutions rise up to the challenge and do something that will change the lives of our people.**

## Conclusion:

- Let us as consumers of these health services demand that all measuring equipment used when administering medical services to us is calibrated or verified and traceable to the national Standards.

Conclusion:



**THANK YOU FOR LISTENING**

**MAY GOD BLESS US ALL**