



A Fundamental Approach To The Diagnostic Laboratory Tests

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ABSTRACT

For every medical person before ordering the medical laboratory tests the basic concepts regarding the lab tests are mandatory. The lab must be following some norms and there must be a system of Quality Control and Quality assurance. There is a common accreditation system which control Quality system by proficiency testing system of same sample in various laboratory systems. Before that there is fully automated system of instruments which is updating the results upto more than one lakh. Here there is no manipulation by manually and the results may be retreated whenever we need. There is a scoring system and the assessment of specificity and sensitivity of each result are compared with the referral laboratory.

KEY WORDS : Quality control, Quality Assurance, Sensitivity, Specificity

Scope

Laboratory Tests are classified in to three groups namely

- a) Screening tests, which are identifying asymptomatic persons with risk factors.
- b) Diagnostic tests which help to establish or to exclude the presence of diseases.
- c) Testing management of diseases, which evaluate the severity of diseases and estimate the prognosis.

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A false positive rate is complement to specificity when the individual is disease free.

A false negative rates are complement to its sensitivity even the individual is diseased.

Many factors alter the laboratory test results like age, race, sex, posture, diet, drugs, and level of exercise. The instruments are mostly validated and the methods are also validated before feeding them with the samples. The laboratory results may assist in the clinical diagnosis and lead to a better understanding followed by mangement of the disease.

Introduction

Now a days, patient will satisfy only after his laboratory reports are negative. There is also some clinical awareness among the educated individuals/treatment to the patient by a physician mostly depends upon the laboratory investigation.

This article may be helpful for laboratory technical staff and doctors to get a better understanding of laboratory reports. Now in modern era, the laboratory medicine is developed vastly. For a medical person, he must have some basic concepts regarding the interpretation of laboratory results.

The laboratory report to be kept as confidential information or else a clue for the doctor and at any cost it should not be disclosed to the patient or to be discussed with his relative. Especially when in intensive care it is better to give no report when the laboratory staff is doubtful about the sensitivity of the test [1-2].

It is better now to define the sensitivity and specificity of the laboratory results. Sensitivity is a measure of the probability that a test result will be positive if the disease is present in the individual. Specificity is a measure of the probability that a test result will be negative if the disease is not present in individual [3-4]. Positive predictive values indicate sensitivity. Negative predictive value indicates specificity.

The laboratory tests are easily acceptable to the patients. They are sensitive enough to detect disease in the presymptomatic period of the disease for example while monitoring the enzyme assay like (ALT) Alanine Transaminases which is increased about 200-1000 IU/L (10-40 IU/L), even when the serum bilirubin is normal and there is no typical clinical symptomatology except, the undue tiredness and loss of appetite.

The laboratory tests are low cost and safety to perform. Laboratory tests are definitely something when the clinical diagnosis is either extremely unlikely or almost certain.

Laboratory tests are useful to doctors

Before ordering a laboratory test for a patient roughly, the doctors estimate the likelihood of disease. When a disease is highly unlikely there is wastage of time and money and there is a chance of false positive test. For example, there is a patient of middle aged women who is visibly and clinically anemic patient. For this patient a doctor prescribed Hb, Hematocrit, Mean Corpuscular Volume (MCV), Mean Corpuscular hemoglobin (MCH), Mean corpuscular hemoglobin concentration (MCHC), Total Red blood cells (RBC), White blood cells (WBC) count, and differential count. The patient is walking up the laboratory for the result. There is no clinical history and the drugs currently taken by the patient. There is no proper interpretation by the laboratory staff and this is no way useful to the patient and the doctor.

Excluding a disease requires a negative result with high sensitivity (low False Negative). Confirming a disease requires a positive result with high specificity (low False Positive [4-5]).

Quantitative laboratory tests yield gaussian Bell shaped curve, this usually overlaps with some amount of healthy individuals with the diseased. The laboratory assigns a cutoff point to separate the normal test value from abnormal result. The choices of cut off value determine the sensitivity and specificity. Every laboratory can design a requisition form, the time of taking the sample and volume of blood taken from the patient approximately a quantity that would generally allow for the repeating of the test if necessary [6-7].

To define a blood collection, we decide that any specimens received within 15 minutes and labeled will be considered as single collection.

The laboratory collect sample in the prelaboratory bottle and time of collection is noted. This will maintaining identity and core at reporting [1-3].

Interpretation of laboratory Results

Quality control system is a must for every laboratory and it is maintained by a qualified clinical persons. When a plasma glucose level is elevated more than 200 mg % it may be supported along with the finding of glucose in the urine. The clinical persons who are in charge of laboratory may add some investigation in order to support or exclude the clinical diagnosis.

The laboratory person who will check the sample should check sampling error, reagent error, and instrumental error. He will calibrate the reference value according to the kit and it is better to write the laboratory normal range along with the laboratory report. Lastly we will be careful enough for minimal technical error like pipetting error must be checked, since most of the micro assay need the small quantity of microlitre [8-9].

The laboratory system must follow the Quality Assurance and Quality control. This Quality Control comprises internal Quality Control and external Quality Control. The internal Quality Control will decide the precision of the laboratory tests and the external Quality Control will decide the accuracy of the laboratory system. Thus the laboratory result should indicate the prognosis of the disease and leads to a better understanding of the progress of the disease. The laboratory results may benefit the patient and influence the research oriented of preventive aspect of the disease. For example finding of amoebic cyst in the stool examination of the food handlers of the hospital kitchen staffs, the laboratory report must be reconfirmed by the clinical person.

Then the affected person must be withdrawn from the service until his stool examination is negative [10-11].

For diagnosing the hypothyroidism in the notational is very essential because after instituting the thyroxin therapy we can prevent the complication like growth failure and mental retardation.

Conclusion

We conclude this article, that there is much to speak and think about the laboratory diagnosis in the developing country like India. The laboratory designing and setting must be completely changed. There is a proper interpretation in the laboratory system. To serve properly the needful patients the laboratory system must be streamlined. There must be a correlative approach even for screening test for AIDS, Hepatitis B, C and sickly cell traits. For the proper evolution of anemia in childhood a laboratory may go for the studies of hemoglobin electrophoresis and serum Ferritin level so that the further complication might be avoided. Then for the disease like Diabetes and Hypertension there must be weekly checkup and proper laboratory assessment of serum insulin assay and Glycosylated Hemoglobin and urinary Vanylyl Mandelic Acid.

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