CAUSES OF IMPRECISION AND INACCURACY IN MEDICAL LABORATORY.

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INTRODUCTION

ACCURACY AND PRECISION

Two terms are often used interchangeably to describe the quality of results obtained in the laboratory, they are accuracy and precision.

Accuracy refers to how closely the measured value of a quantity corresponds to it's true value. It is also a degree of closeness between measurement of a quantity and that quantity's actual value.

Precision express the degree of reproducibility or agreement between repeated measurements. It is also called reproducibility or repeatability.

Precision is also the degree to which repeated measurement under unchanged conditions show the same results. For laboratory test result to be valid, it must be accurate and precise.

IMPRECISION AND INACCURACY

Laboratory testing is a highly complex process that have a great influence on clinical decision. 60-70% of the most important decision on admission, discharge and medication are based on laboratory test results. With this high degree of the influence the quality of laboratory tests and reports is of utmost important. Imprecision is when laboratory result can not give the right diagnosis to a patient's medical condition. It is a result of random errors.

Inaccuracy is the disagreement between the expected quantity and it's actual true value.

Imprecision and inaccuracy may occur at the pre-analytical stage (insufficient

sample & incorrect identification), analytical stage (sample mix up/ interference), and post-analytical stage (improper data entry and turn around time).

CAUSES OF IMPRECISION IN THE LABORATORY

1. Incorrect and variable pipetting and dispensing caused when wrong pipetting and dispensing techniques are done poorly due to

Inadequate training of staffs.

No supervision of trainees.

Pipette with chipped end or unclear marking.

Wrong clearing and drying of pipette tips before re use.

2. Wrong mixing of sample with reagent.

3. Preparation of smear that is too thick for microscopical examination or for staining.

4. Incorrect reporting of microscopical preparation and lack of standardization.

5. Glass wares or plastic wares not clean and dry completely before reuse

6. Samples are not incubated consistently where incubation test is required.

7. Equipment malfunction caused when

- Laboratory staff are not trained on how to use and maintain the equipment
- Instrument reading fluctuates due to unstable power supplies and equipment is not filtered with a voltage stabilizer.
- Dirty or finger mouth cuvette are used in colorimeters or sample contain air bubbles.

CAUSES OF INACCURACY IN THE LABORATORY

Use of automatic pipette set at an incorrect volume.

Use of control sera that has been wrongly prepared or incorrectly storage or used beyond its expiring date. Consistent calculation error.

Incubation of sample at incorrect temperature due to temperature of water bath being wrongly set.

Use of unsatisfactory reagents caused when they are poorly prepared due to unstable water for preparation, contamination by dirty or wet pipette.

Poor reporting by the staff on microscopic examination due to poor training.

SUMMARY

Imprecision is the result of random errors. It is expressed as standard deviation (SD) and coefficient of variation (CV %). It is referred to as errors of scatter because they are irregular or random. Inaccuracy is the disagreement between the expected quantity and it's actual true value. The causes of imprecision and inaccuracy in medical laboratory includes: incorrect and variable pipetting and dispensing caused when wrong pipetting and dispensing techniques are done poorly due to, inadequate training, no supervision of trainees, pipette with chipped ends or unclear marking, wrong cleaning and drying of pipette tips before reuse. Wrong mixing of sample with reagent. Incorrect reporting of microscopical preparation due to lack of standardization. Incubating sample at incorrect temperature. Poor reporting by the staff on microscopic examination due to poor training.

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