

NAME: OGUNYEMI TOSIN

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## ASSIGNMENT

### QUESTIONS

1. A new method of glucose estimation is being promoted by Yeenx inc. as the scientist in charge of your laboratory, discuss the steps you would take to ascertain the suitability of the new method for your laboratory.
2. Exhaust all available avenue in discussing the sequential steps in determining whether an analytical run have been properly performed or not.
3. As a medical laboratory scientist with bias for clinical chemistry testing, explain the assessment of an imminent multiple organ/ system failure sequel to covid-19 infection.

### ANSWER

1. Test for suitability of new method

The test for suitability of new methods involves preliminary consideration and technical consideration.

Preliminary consideration involves:

- Cost per test: the cost of the new method should be considered. If it would be too expensive or not.
- Make verse buying decision: why make a difficult test while you can buy and why buy a simple test while you make it.
- Safety: the reagent for the new test is it safe
- Required technical input: the new method should studied to know if it would require specially trained personnel to carry out the procedure.
- Turnaround time: is the time interval from the time of sample processing to the time the result is released to the patient.

Technical consideration

- Accuracy: is the nearest and closeness of test result obtained by the method to the true value.
- Precision: is the degree of agreement among individual test result when the method is repeated to multiple sampling of a homogenous sample.
- Specificity is the ability to measure accurately and specifically the analyte of interest in the presence of other alike component that may be expected to be present.
- Sensitivity is the ability to measure the analyte of interest even when it is in a minute amount
- Recovery: is measured as the percent of analyte recovered by assay. The recovery can be determined by the equation.

Recovery=  $\frac{\text{analytical result}}{\text{Accuracy}} \times 100\%$

2. Test for acceptability of analytical run/ result
  - Matching the result with the control value (use of control): control value is always known by the control officer so control samples will be given along with the test sample. If the value of control is near the true value of the control then the test value will be near the true value and vice versa (the result of the control can be  $x \pm 2(0.3)$  for it to be considered as correct.)
  - Passing the result with other parameter: the test result can be compared with other related parameter.
  - Matching the result with provisional diagnosis
  
3. Corona virus also known as covid 19, is an infectious disease caused by severe acute respiratory syndrome coronavirus2 (SARS-CoV-2) which has been largely influenced by multi-organ involvement. Comorbities such as cardiovascular diseases have been the most common risk factors for severity and mortality. This disease was first identified amid an outbreak of respiratory illness cases in Wuhan city, China. SARS-CoV-2 is an enveloped positive sense RNA virus and belong to the beta corona virus genus (sarbecovirus subgenus, orthonavirinae sub family). It represent the 7<sup>th</sup> member of coronaviridae family known to infect human. It shares the cellular receptor which is the angiotensin- converting enzyme 2 (ACE2) receptor. ACE2 receptor are enriched in alveolar epithelial type II cell of lung tissue as well as extra pulmonary tissue such as the heart endothelium, kidney and intestine which might play role in the multi organ effects of covid 19. The hyper inflammatory response of the body, coupled with the plausible direct effects of SARS-CoV-2 on body wide organs through ACE2, has been associated with complications of the disease. Acute respiratory distress syndrome, heart failure, renal failure, liver damage, shock and multi-organ failure have been the cause of death. Acknowledging this and potential organ injuries has been important in the clinical management of patients.

#### Route of transmission

Transmission occurs through respiratory droplet from coughing and sneezing. Virus released in respiratory secretions can infect other individuals through direct contact with mucous membranes. Droplets usually cannot travel more than 6 feet. The virus can also persist on surfaces to varying duration and degrees of infectivity.

#### Symptoms

COVID-19 symptoms can be very mild to severe and include a fever, cough and shortness of breath. Some people have no symptoms. Symptoms may appear two to 14 days after exposure

Common symptoms include the following:

- Fever
- Cough
- Myalgia
- Fatigue

Less-common symptoms include the following:

- Headache
- Sputum production
- Diarrhea
- Malaise

- Shortness of breath/dyspnea
- Respiratory distress

#### Prevention of corona virus

The WHO recommend the rational use of personal protective equipment in health care and home care setting and also the regular washing of hands. Personal protective equipment recommended for use include:

- Wearing of disposable gloves to protect hands.
- Clean, non-sterile long sleeve gown to protect clothes from contamination
- Medical mask: to protect nose and mouth it is advice that face mask should be used in communities, home and health care settings.
- Eye protection e.g googles, face shield

#### Investigations

- Cardiovascular involvement

The exact mechanism of cardiovascular involvement in COVID-19 is not yet well understood, however elevated cardiac biomarker levels are commonly seen, such as; creatine kinase- MB, lactate dehydrogenase and myoglobin . Patients with existing cardiovascular disease (CVD) are at a greater risk of suffering from severe COVID-19

- Renal involvement

Acute Kidney Injury (AKI) is the abrupt loss of kidney function that develops within 7 days, its incidence has been observed with SARS-CoV-2 leading to increase level of urea and creatinine, low urine output.

- Gastrointestinal involvement

A significant number of patients reported gastrointestinal (GI) symptoms such as diarrhoea, nausea, vomiting and abdominal pain, with some reporting these symptoms as their sole presenting complaint. The incidence of GI symptoms, alongside the detection of SARS-CoV-2 RNA in stool samples of infected patients, suggest that ACE2 receptors highly expressed in the GI tract are another target for SARS-CoV-2 infection.

- Liver injury in COVID-19 patients

Mild and transient liver injury, as well as severe liver damage can occur in COVID-19. COVID-19 patients often have abnormal levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST) and bilirubin during the course of the disease, with bilirubin showing the smallest elevation. Furthermore, they reported that severity of liver damage is proportional to that of COVID-19. Gamma-glutamyl transferase (GGT) was elevated in some patients.

Assessment of multiple organ/ system failure sequel to covid-19 infection involves the following functional test

1. Renal function test which include urea, creatinine, electrolytes

2. Liver function test which include total protein, albumin, bilirubin, alanine aminotransferase, alkaline phosphatase, aspartate transaminase, gamma- glutamyl transferase
3. Cardiac function test include lactate dehydrogenase, creatine kinase-MB, myoglobin