

REQUEST AND ANALYSIS OF NON-ON CALL TESTS



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CHEMICAL PATHOLOGY

CONTENTS:



Requests and analysis of:

- **Outsource sample**
- **Sample run by batch**
- **New test (not available in Unimed)**

- **Specimen rejection**

S/N: 1834



**STANDARDS
MALAYSIA**

Certificate of Accreditation

No: SMM 688

Accredited since: 30 December 2014

This is to certify that

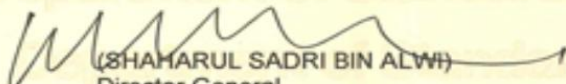
JABATAN MAKMAL DIAGNOSTIK KLINIKAL
(DEPARTMENT OF CLINICAL DIAGNOSTIC
LABORATORIES)
PUSAT PAKAR PERUBATAN UNIVERSITI
TEKNOLOGI MARA (PPUITM)
SELANGOR
MALAYSIA



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for the current scope of accreditation

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(SHAHARUL SADRI BIN ALWI)
Director General
Department of Standards Malaysia

RCPAQAP

The Royal College of Pathologists of Australasia
Quality Assurance Programs

MSOC QAP

MALAYSIAN SOCIETY OF CYTOLOGY QUALITY ASSURANCE PROGRAMME | EST. 2018



RIQAS

INTRODUCTION



Chemical Pathology Unit provides laboratory and consultative services in the areas of diagnostic and research as follows:

- a) Urgent tests
- a) 24-hour (on-call) tests
- a) Routine tests
- a) Specialised tests

ONCALL TEST

Definition:

Tests which are offered over 24 hours.

Tests which are NOT offered over 24 hours.

- **OUTSOURCE SAMPLES**
- **SAMPLES RUN BY BATCH**
- **TESTS NOT AVAILABLE IN UNIMEDS**

24-HOUR (ON-CALL) TESTS

List of tests offered:

- ✓ Renal Profile
- ✓ Blood Gases
- ✓ Liver Function Test
- ✓ Bone Profile
- ✓ Amylase
- ✓ Aspartate aminotransferase (AST)
- ✓ Calcium
- ✓ Corrected Calcium
- ✓ Creatine Kinase
- ✓ C-reactive protein
- ✓ Creatine Kinase
- ✓ C-reactive protein
- ✓ Glucose
- ✓ Magnesium /Phosphate
- ✓ hs Troponin T
- ✓ Body Fluids Biochemistry
- ✓ Bilirubin (total/direct)
- ✓ Urine FEME (dipstick only)
- ✓ Urine Pregnancy Test
- ✓ Vancomycin
- ✓ NT- pro BNP

OUTSOURCE SAMPLE.

- Definition of outsource sample.
- Example of outsource specimens.
- Referral laboratory.
- Procedure to send outsource sample.
- Turnaround time
- Result

OUTSOURCE SAMPLE

Outsource sample:

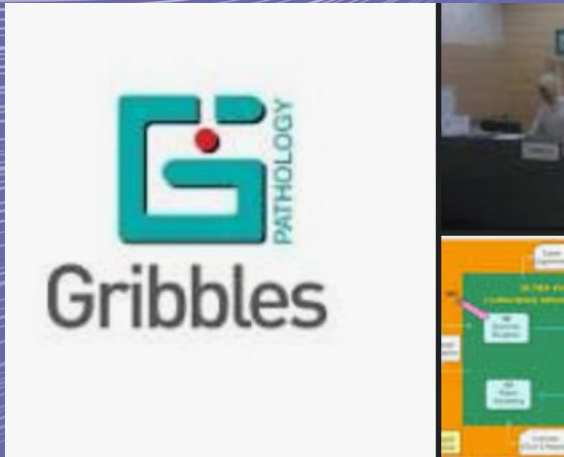
Specimens that are required to be sent to the **referral laboratories** because analysis for examination requested are **not** available in our centre

Referral laboratory:

Referral laboratory is an **external laboratory** to which specimens are submitted for examination that are not available in our center.

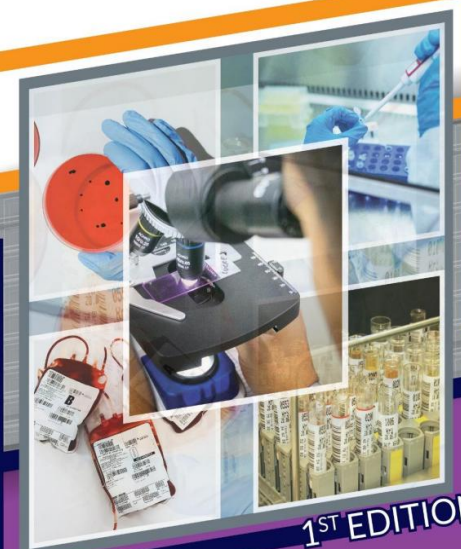


HUiTM/PPUiTM



OUTSOURCE SAMPLE:


| NO. | TEST | SPECIMEN TYPE | VOLUME REQUIRED | SPECIMEN CONTAINER | INSTRUCTION | DESTINATION |
|-----|-------------------------------------|------------------|---------------------|---------------------------|--|----------------|
| 1 | 17-hydroxy progesterone | Serum | 3 ml | Plain tube | Complete PER PAT.301 form and send it along with the sample to CDL within 2-4 hours. | UMMC |
| 2 | 5-HIAA urine (24 hours) | Urine 24 hours | 24 hours collection | 24 hours bottle container | Complete PER PAT.301 form and send it along with the sample to CDL immediately. | UMMC |
| 3 | Acetaminophen (PCM) | Serum | 3 ml | Plain tube | Complete PER PAT.301 form and send it along with the sample to CDL within 2-4 hours. | Hosp. Sg Buloh |
| 4 | Adreno corticotropic Hormone (ACTH) | Plasma | 3 ml | K2-EDTA tube in ice (4°C) | BY APPOINTMENT with the lab (at least 3 days before collection). i) Pre-chill the tube & syringe overnight before use. ii) After collection, send immediately to lab. | UMMC |
| 5 | Alanine Transaminase (ALT) | Serum | 3 ml | Plain tube | Send to the CDL within 2-4 hours. | CDL |
| 6 | Albumin | Serum | 3 ml | Plain tube | Send to the CDL within 2-4 hours. | CDL |
| 7 | Albumin (CSF) | CSF | 3 ml | Bijou bottle | Send to the CDL immediately. | CDL |
| 8 | Albumin (Peritoneal Fluid) | Peritoneal fluid | at least 15 ml | Bijou bottle | Send to the CDL immediately. | CDL |
| 9 | Alcohol Level | Serum | 3 ml | Plain tube (without gel) | Complete PER PAT.301 form and send it along with the sample to CDL immediately. MANDATORY TO USE A PLAIN TUBE WITHOUT GEL. | HKL |



1ST EDITION

Clinical Laboratory Handbook

DEPARTMENT OF CLINICAL DIAGNOSTIC LABORATORIES
 HOSPITAL UNIVERSITI TEKNOLOGI MARA


 STANDARDS
 MALAYSIA
 ACCREDITED LABORATORY

OUTSOURCE SPECIMENS:

Refer to Clinical Laboratory Handbook for:

- Specimen type
- Volume required
- Specimen container
- Instruction
- Destination

<https://hospital.uitm.edu.my/images/departments/clinical/pathology/download/2021-CDL-Handbook-v11Oct.pdf>

| NO. | TEST | SPECIMEN TYPE | VOLUME REQUIRED | SPECIMEN CONTAINER | INSTRUCTION | DESTINATION |
|-----|-----------------------|---------------|-----------------|--------------------|--|-------------|
| 39 | Cancer 15-3 (CA 15-3) | Serum | 3 ml | Plain tube | Complete PER PAT.301 form and send it along with the sample to the CDL within 2-4 hours. | HKL |
| | | | | | Complete PER PAT.301 form | |



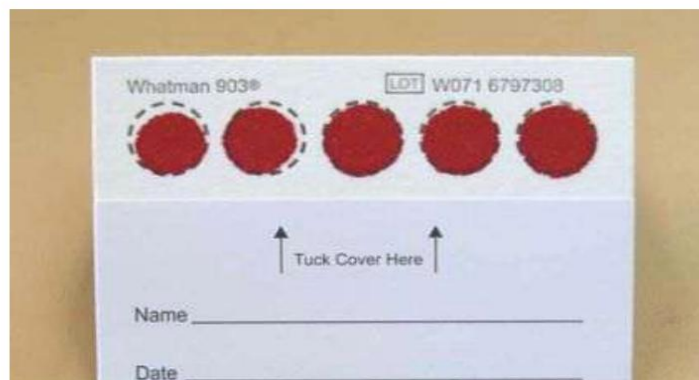
Clinical Laboratory Handbook

DEPARTMENT OF CLINICAL DIAGNOSTIC LABORATORIES
HOSPITAL UNIVERSITI TEKNOLOGI MARA



DRY BLOOD SPOT SPECIMEN COLLECTION INSTRUCTIONS

1. Clearly label the 903 Protein Saver card with Patient ID and Date.
2. Disinfect fingertip with alcohol pad.
3. Prick fingertip using lancet/needle.
4. Allow full drop of blood to collect on finger. Use cotton to wipe this drop.
5. Collect the remaining drops of blood onto 903 Protein Saver card. Try to collect 5 full drops of blood. (Drop of blood should fully form before dropping into filter paper).
6. Hold cotton on fingertip until bleeding stops.
7. Allow filter paper to dry before placing card in a plastic bag. Card needs to dry for at least 4 hours.
8. Once dried, place Protein Saver card in a sealed plastic bag with desiccant packet.
9. Fill out requisition form completely and place it back in the outside pouch of the specimen bag. The name on protein saver card should match the name on the form. Place specimen bag into the enclosed envelope. Please mail envelope within 24hrs after specimen collection.



OUTSOURCE SAMPLE: TAT

- Turnaround time – depends on the respective referral laboratory
- Result will be scanned and uploaded into Unimed.

The screenshot displays the Unimed system interface. On the left is a navigation menu with options: Patient/Client, Patients, Summary, Visits, Emergency Department, Order, Clinical Notes, Visit Form, Clinical Report, Appointment, ADT, Inpatient, Document Management, Documents, QMS, Private Patient, OTMS, Itemized Billing, Store & Stocks, and Reports. The main content area is divided into two sections: 'DOCUMENT HISTORY' and 'DOCUMENT LIST'.

DOCUMENT HISTORY

MRN No :

Patient Name :

Categories : start date and end date is compulsory to enter before continue clicking on search button.

Start Date :

End Date :

DOCUMENT LIST

Show entries Search:

| No | MRN No | Patient Name | Categories | Encounter | Date Upload | Upload By | Document Date | Action |
|----|------------|--------------|------------|-----------|---------------------|--------------|---------------|--|
| 1 | CTC0003107 | [REDACTED] | Lab Report | -NA- | 10-06-2022 16:13 PM | S [REDACTED] | 10-06-2022 | <input type="button" value="Print"/> <input type="button" value="Delete"/> |
| 2 | CTC0003107 | [REDACTED] | Lab Report | -NA- | 16-12-2019 11:11 AM | S [REDACTED] | 14-11-2018 | <input type="button" value="Print"/> <input type="button" value="Delete"/> |

Showing 1 to 2 of 2 entries Previous Next



SAMPLES RUN BY BATCH

SAMPLE RUN BY BATCH.

- **Definition**
- **Example of tests.**
- **Turnaround time**
- **Result**

SAMPLE RUN BY BATCH

A laboratory testing procedure in which **one test** is done **simultaneously** on **multiple specimens**.

SAMPLE RUN BY BATCH

- **Tests that are run in batches**

- a) **Endocrine tests**
- b) **Dynamic function tests**
- c) **Anaemia profile**

- **Turnaround time – 5 working days.**

WEDNESDAY

- Serum iron profile
- Serum Folate
- Serum B12

THURSDAY

- Serum cortisol
- Serum testosterone
- Serum prolactin
- Serum Progesterone
- FSH
- LH
- Estradiol

To consult pathologist if result is needed urgently



NEW TESTS

(Tests not available in Unimeds)

Default

Top Bot

 Patient/Client

Patients

Summary

Visits

Emergency Department

Order

Prescription

Pathology

Create New

Previous Order

Specimen Collection-Inpatient

Status

Transfusion Medicine

Radiology

NICL

Respiratory

Clinical Notes

Visit Form

Clinical Report

Appointment

ADT

Inpatient

Document Management

 QMS

Chemical Pathology

Haematology

Microbiology

Anatomic Pathology

Transfusion Medicine

Blood Product

Chemical Pathology

Single Biochemistry Test

- Albumin - Peritoneal
- Alpha-1-Fetoprotein
- Amylase
- Amylase (Other Fluid)
- Aspartate Transaminase
- C-Reactive Protein
- Caeruloplasmin
- Cancer AG 125(CA 125)
- Cancer AG19-9 (CA 19-9)
- Carbamazepine
- Carcinoembryonic AG (CEA)
- Chloride
- Creatine Kinase
- Faecal Occult Blood (FOB)
- Fasting Plasma Glucose
- Folate
- Glucose Random
- HbA1c
- HS Troponin I
- Lactate (arterial)
- Lactate (venous)
- LDL (Blood)

Profile Biochemistry Test

- ALDOSTERONE RENIN RATIO
 - Aldosterone
 - Renin
- BLOOD GAS (ARTERIAL)
- BLOOD GAS (VENOUS)
- BONE PROFILE
 - Albumin
 - Alkaline Phosphatase
 - Calcium
 - Corrected Calcium
 - Phosphate
- BUSE
 - Chloride
 - Potassium
 - Sodium
 - Urea
- CORD BLOOD GAS (ARTERIAL)
- CORD BLOOD GASES (VENOUS)
- CORRECTED CALCIUM PROFILE
 - Albumin

Profile Biochemistry Test

- LIPID PROFILE (FSL)
 - HDL-Cholesterol
 - LDL-Cholesterol
 - Total Cholesterol
 - Triglycerides, Fasting
- LIVER FUNCTION TEST (LFT)
 - Albumin
 - ALP
 - ALT
 - Direct Bilirubin
 - GGT
 - Total Bilirubin
 - Total Protein
- OLIGOCLONAL BAND (CSF ELECTROPHORESIS)
 - Oligoclonal Band (CSF)
 - Oligoclonal Band (SERUM)
- RENAL PROFILE
 - Chloride
 - Creatinine
 - Potassium

Profile Endocrine Test

- AMENORRHOEA STUDY
 - Estradiol, Total
 - FSH
 - LH
- CATHECHOLAMINE PROFILE(URINE24H)
 - 24H Urine Adrenaline
 - 24H Urine Dopamine
 - 24H Urine Noradrenaline
- INFERTILITY STUDY
 - Estradiol, Total
 - FSH
 - LH
 - Progesterone
- THYROID FUNCTION TEST
 - Free T4
 - TSH

Single Endocrine Test

- Cortisol Serum
- DHEAS
- Free T3
- Insulin

Urinary Biochemistry

- 24H Urine Magnesium
- 24H Urine Total Protein
- UACR
- UPCR
- Urine Calcium (random)
- URINE DIPSTICK
- URINE DRUG TOXICOLOGY
- URINE FEME
- Urine Magnesium
- Urine Osmolality
- Urine Potassium (random)
- Urine Pregnancy Test(UPT)
- Urine Sodium (random)

Requester to contact laboratory personnel



Laboratory to find further information regarding the test (availability, instructions, price)



Laboratory to liaise with Bendahari



IT personnel to create test code in Unimeds



Once the process is completed, clinicians will be notified and may proceed with ordering the test



SPECIMEN REJECTION

SPECIMEN REJECTION

- Unlabelled/mislabelled
- Specimen received without a label or with improper identification
- Specimen of questionable integrity (depending on tests ordered)
- Incorrect transport container
- Insufficient volume
- Haemolysis (depending on tests ordered)
- Improper handling or storage of specimen
- Clotted specimen (depending on tests ordered)
- Lipaemic samples
- Icteric samples
- No specimen received (only request form received)
- Repetitive test order / double request
- The test is not clinically indicated
- The test is not offered

Downloadable from <https://hospital.uitm.edu.my/images/departments/clinical/pathology/download/2021-CDL-Handbook-v11Oct.pdf>



SPECIMEN REJECTION

CHEMICAL PATHOLOGY

JANUARY – DECEMBER 2021

CHEMICAL PATHOLOGY SPECIMEN REJECTION 2021

JAN – JUNE 2021 (512 out of 28,396 (1.8%))

| Rejection criteria (Top 3) | No. 1 | No. 2 | No. 3 |
|----------------------------|-------|----------------------------------|---------------------|
| | | (Double/repetitive order) | (Haemolysis) |
| Percentage of rejection | 42.6% | 30.5% | 8.8% |

JULY- DEC 2021 (541 out of 31,114 (1.74%))

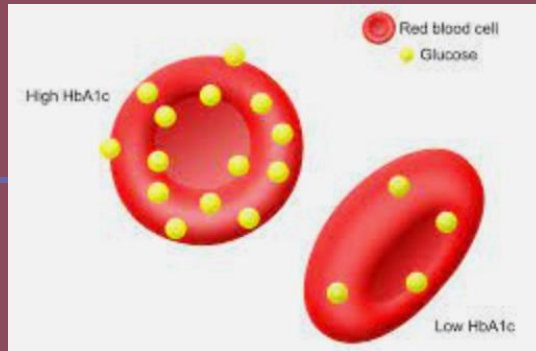
| Rejection criteria (Top 3) | No. 1 | No. 2 | No. 3 |
|----------------------------|-------|----------------------------------|---------------------|
| | | (Double/repetitive order) | (Haemolysis) |
| Percentage of rejection | 43.6% | 28.5% | 5.7% |

REPETITIVE REQUESTS

Commonly affected tests:

- **HbA1C** (requested less than 8 wks from the previous testing).
 - Waste of resources (ie materials, reagents)
 - Increases lab's workload
 - Delayed in TAT of other genuinely necessary tests
 - Increases the rate of specimen rejection, cost

HBA1C REQUESTS <8 WEEKS FROM PREVIOUS TESTING



- It represents the average rate of glycation over the lifespan of HbA (120 days), particularly in the previous 6-8 weeks.
- Glycation is a SLOW, irreversible process.

| Ref | Clinical situation | Recommendation | Source |
|-------|---|--|--|
| B-E19 | HbA1c monitoring of patients with type 2 diabetes | Two to six-monthly intervals (tailored to individual needs) until the blood glucose concentration is stable on unchanging therapy; use a measurement made at an interval of less than three months as an indicator of direction of change, rather than as a new steady state Six-monthly intervals once the blood glucose concentration and blood glucose lowering therapy are stable | NICE. NG28, 2015. ³⁴ <i>[Level of evidence – B.]</i> |

The Royal College of Pathologists
Pathology: the science behind the cure

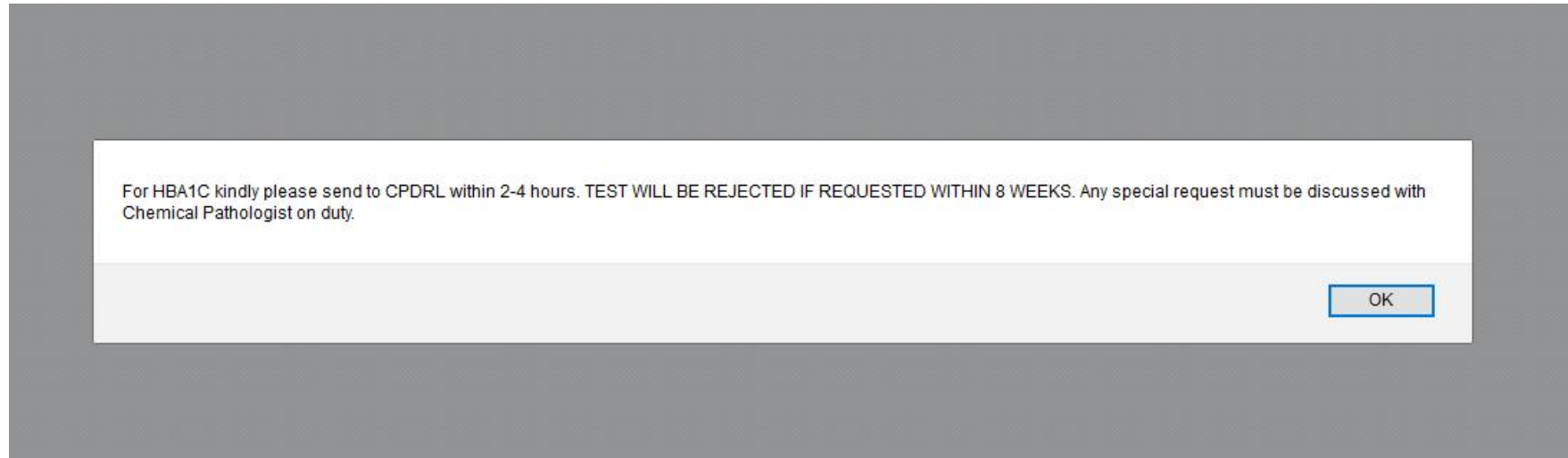
The Association for Clinical Biochemistry & Laboratory Medicine
Better Science, Better Testing, Better Care

IBMS Institute of Biomedical Science

National minimum retesting intervals in pathology

March 2021

REMINDERS IN UNIMEDS FOR HBA1C REQUESTS



Pathology Order Confirmation

| No | Test Name | Price(RM) | Form | Specimen | Test Location | Priority | Action |
|----|--|-----------|---------|----------|----------------|--------------------------|--------|
| 1. | BLOOD GASES (VENOUS) | 32.00 | - N/A - | BLOOD | CPDRL SG BULOH | <input type="checkbox"/> | DELETE |
| 2. | HBA1C - Previous Sample Taken : 10-10-2017 | 16.50 | - N/A - | BLOOD | CPDRL SG BULOH | <input type="checkbox"/> | DELETE |
| 3. | OGTT | 7.00 | - N/A - | PLASMA | CPDRL SG BULOH | <input type="checkbox"/> | DELETE |

Specimen collection : Today Appointment

| No. | Test Name | Special Instruction | Volume Required | Offsite test |
|-----|----------------------|--|-----------------|--------------|
| 1 | HBA1C | Send to CPDRL within 2-4 hours. TEST WILL BE REJECTED IF REQUESTED WITHIN 8 WEEKS AFTER PREVIOUS REQUEST. Any special request must be discussed with Chemical Pathologist on duty. | 3 ml | |
| 2 | BLOOD GASES (VENOUS) | Send to CPDRL immediately in ice | 1 ml | |

HEMOLYSIS

Effects of haemolysis:

- Overestimation of K, ALT, AST, creatinine, CK, iron, LDH, lipase, Mg, PO₄, urea.
- Significantly decreased Na, albumin, ALP, Cl, GGT and glucose.
- A hemolysis index of ~150 (Hb 1.9 g/L) caused > 20% change in cardiac troponins (the direction of change depends on assay).

Lippi G et al. Influence of hemolysis on routine clinical chemistry testing. Clin Chem Lab Med 2006;44(3):311–316 Renze Bais, The Effect of Sample Hemolysis on Cardiac Troponin I and T Assays, Clinical Chemistry 2010; 56(8), 1357–1359

HEMOLYSIS : PREVENTION

- Use suitable needle gauge (20-22 G for routine collection).
- Draw sample from antecubital region of the arm.
- Do not leave the tourniquet on for > 1 minute. Prolonged tourniquet time causes the interstitial fluid to leak into the tissue, promoting hemolysis
- Allow venipuncture site to completely air dry after cleaning with alcohol. Avoid drawing from catheters and lines
- Fill tubes to correct volume. Under-filling of tubes containing anticoagulant results in a higher than recommended concentration of the additive, which promotes hemolysis.
- Mix additives with the specimens by inverting tubes gently. Vigorous mixing or shaking can break the cells.

CLOTTED SAMPLES

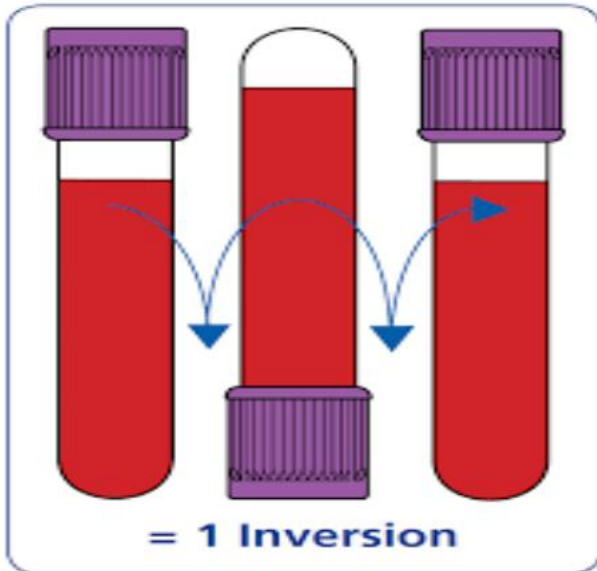
EFFECTS OF CLOTTED SAMPLES:

- Clots may alter composition of the specimens, producing inaccurate results.
- Clots can block the systems inside the analyzer, leading to analyzer breakdown and downtime → delay in TAT

CAUSES OF CLOTTED SAMPLES

- Delay of placing blood in tubes with additives e.g. leaving blood in a syringe too long before transferring to the tube.
- Improper mixing of blood with anti-coagulants in tubes or syringes (for blood gases).
- Over-filled tubes, leaving too little or no air-space that will enable proper mixing with anti-coagulants.

PREVENTION OF CLOTTED SAMPLES



- Transfer blood into the appropriate blood tubes immediately after collection.
- Fill the tubes with the recommended sample volume (as indicated on the tube).
- Gently invert the tubes to properly mix the blood with the anticoagulants (depends on type of tubes, usually 8-10 times).
- For blood gases, ensure the syringe is free of air bubbles and roll the syringe between your palms.

QUIZ



The following are the preventive measures for specimen hemolysis EXCEPT:

- a) Use an appropriate needle size
- b) Collect the specimen from the antecubital region of the arm.
- c) Leave the tourniquet on for > 1 minute.
- d) Mix additives with the specimens by inverting tubes gently.