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# REQUEST FOR LABORATORY SERVICES

## Patient Requisition

For NUH patients the Clinician Computerised Order Entry (CCOE) will utilise the Aurora system to create and collect laboratory orders for the patients.

All formats of laboratory requests must comply with mandatory patient information requirements:

- **Patient's Name**
  - Printed or legibly written using the below conventions
  - Examples
    - Lim Ah Guan Kevin
    - BO Rahimah Bte Abdul Rahman Twin I
    - Rajamani SS @ Rajagopal SS
    - Whitefield Gordon JP
- **Patient's Identity**
  - The National Registration Identity Card (NRIC) number is use as the patient's identity number. It should be expressed in the form S1234567C.
  - When an NRIC is not available the hospital system will generate a Hospital Registration Number (HRN).
  - Two persons must not share the same HRN. Relatives of a patient requesting family screening must register with their own identity numbers.
- **Patient Location**
  - For both in-patient and out-patient requests the "ordering location" captured in Aurora will be reflected in the Laboratory Information System (LIS) as the location of the patient. This information will be obtained from SAP.
  - For NRL specimens an internally generated location code will be generated which will allow traceability to original requestor.
- **Date & time of Specimen Collection**
  - In Aurora "collect" and confirm to print labels for an order only when the actual sample is to be collected and dispatched to the laboratory.
  - The "collect" date and time flows to LIS and tagged to the test request as the date and time of sample collection.
  - Do not print labels ahead of collection process as they will not accurately reflect the actual time the samples were actually collected from the patient.
- **Age & Gender of Patient**
  - This is essential to be able to provide appropriate reference intervals for all tests.
- **Name and MCR of Ordering Doctor**
  - With an order made in Aurora, the Doctors information will flow with the receipt of the order.
  - In the event an order is made with a manual request form the name of the ordering doctor and MCR must be clearly written. The doctor's signature is also required.
- **Priority of Test**
  - Selected tests may be ordered as URGENT – see [Urgent Tests](#). An urgent test must have its priority selected in Aurora. A pink biohazard bag is to identify an URGENT request on arrival in the laboratory. However the Aurora order must also be URGENT for the test to be processed as URGENT.

- **Account Number**
  - This information will flow from SAP into LIS and will be used for posting of bills.
- **Clinical History**

## Specimen Collection – with Aurora

- Verify the correct patient using two identifiers, for example patient name and identity number.
- Using the Aurora collection screen select the tests previously requested and ready for collection.
- Confirm the collection.
- The printer will generate the correct number of labels for your patient order. They will print the exact number of labels required to complete the order and in the sequence of the correct order of draw, for example 1 of 3 tubes.
- The screen will also provide a visual display of the required number and type of containers and in the correct sequence.
- Proceed with the collection of blood and any other sample type and ensure all labels are affixed to the correct containers.
- Collect sufficient specimen to enable the tests to be performed.
- Please note that every label generated requires to be affixed to a sample. Each barcoded label contains a laboratory order.
- For tests that require different sample types, for example creatinine clearance, please send both blood and 24hr urine to the laboratory together.
- Dispatch all specimens to the laboratory. One bag per patient.
- After the collection process, in the event a specimen is unable to be collected, “uncollect” the tests and document reason for cancellation. This will allow the test status to change from “collected” to “pending” and allow the order to be collected at a later time.
- Discard the unused labels after the “uncollect” process, this is no longer valid.

## Specimen Collection – without Collection Module (iSMART)

- Verify the correct patient using two identifiers, for example patient name and identity number.
- Using the Aurora collection screen select the tests previously requested and ready for collection.
- Confirm the collection.
- The printer will generate the request forms for your patient order.
- Proceed with the collection of blood and any other sample type and ensure demographic labels are affixed to all samples.
- Collect sufficient specimen to enable the tests to be performed.
- Please note that every form generated requires a sample. Each form contains a laboratory order and must be received with a suitable sample.
- Dispatch all specimens to the laboratory. One bag per patient.

## Specimen Collection – non-NUH patients

- Verify that the specimen is collected from the correct patient by checking the patient’s wristband, NRIC or other valid documents
- Collect sufficient specimen in the appropriate specimen containers
- To verify specimen containers please refer to test catalogue.

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## Special Forms

- **Toxicology Analysis**

Please use form [Toxicology Request form 2011 1](#) for requesting toxicology analysis for medico-legal purposes. The Centre for Forensic Medicine of the Health Science Authority (HSA) handles the following types of specimens

- Ante-mortem biological fluids (gastric aspirate, blood and urine) pertaining to suspected overdose situation
- Post-mortem biologic fluids and tissues (liver, kidney and lung)
- Blood and urine for quantitative alcohol determinations
- Exhibits (tablets, capsules, etc) of forensic nature

Submit specimens with the request form. Provide the following information on the form

- The particulars of the patient or deceased
- Signs, symptoms and conditions of the patient or a brief history of the deceased
- The nature of the toxic agent(s) suspected
- The name (in block letters) and signature of the clinician requesting the analysis
- Any other information which may help the analyst in identifying the toxic agent(s)
- Initial of the person requesting the analysis on any alteration of the entries on the form

For submission use disposable containers and tubes with leak-proof screw caps

- Gastric aspirate: at least 50 mL in a plain container
- Blood for drug screening: 5 mL heparinised blood (lithium)
- Blood for alcohol determinations: 5 mL heparinised blood (lithium). Do not use alcohol for swabbing the puncture area or sterilizing the hypodermic needle
- Urine: at least 20 mL in a plain container

Label all specimens legibly and seal with NUH seal.

- **Research Support/Project**

- This form is customized for each researcher who has their research samples tested in our laboratory. The use of this form alerts laboratory staff to the type of tests to be ordered and any special requirements. Our Research Support Coordinators may be reached at 67726189 for more details.

## Blood Specimen

- Blood Collection**

Most laboratory tests are performed on anti-coagulated blood, plasma or serum. Gently invert all tubes 5-10 times to ensure proper mixing of additives (anti-coagulant or clot activator). Shaking the tube may cause haemolysis. Send to the laboratory as soon as possible to allow centrifugation of the specimen and separation of serum/plasma from red cells when necessary.

- Plasma - draw sufficient blood into appropriate tube (Blue, Green or Grey top). Please fill to the line on the blood tube to ensure the correct blood:anti-coagulant ratio.
- Serum - draw sufficient blood into appropriate tube (Red or Gold top).
- Whole Blood - draw sufficient blood into the appropriate tube. Please fill to the line on the blood tube to ensure the correct blood:anti-coagulant ratio.

- Blood Tubes**

Becton-Dickenson® tubes are used in NUH. The table below provides a summary of all tubes available.

Colour Code	Anti-Coagulant	Available Size
Red	No anticoagulant	500 uL microtainer 6.0 mL vacutainer
Gold	No anticoagulant, contains gel for separation of serum. SSTII.	600 uL microtainer 3.5 mL vacutainer 5.0 mL vacutainer
Blue	Sodium citrate	1.8 mL vacutainer 2.7 mL vacutainer
Green	Lithium heparin	400 uL microtainer 4.0 mL vacutainer
Light Green	Lithium heparin, contains gel for separation of plasma. PST.	4.5 mL vacutainer
Pink	EDTA (K <sub>2</sub> ), crossmatch only	6.0 mL vacutainer
Lavender	EDTA (K <sub>3</sub> )	500 uL microtainer 2.0 mL vacutainer 3.0 mL vacutainer
Grey	Sodium fluoride / Potassium oxalate	600 uL microtainer 2.0 mL vacutainer
Dark Blue	No anticoagulant, trace metal free	6.0 mL vacutainer
Dark Blue	EDTA, trace metal free	6.0 mL vacutainer

BacT/Alert® Bottles are used in NUH. The table below provides a summary of culture bottles and their use. These bottles can be obtained from Microbiology Laboratory during office hours

Colour Code	Bottle	Indicated for
Green	BacT/Alert FA Plus Aerobic	Aerobic and/or fungus culture
Orange	BacT/Alert FN Plus Anaerobic	Anaerobic culture
Yellow	BacT/Alert PF Plus	Aerobic culture for paediatrics

Order to draw of blood tubes is important to eliminate contamination with tube additives that may interfere with analysis or requested tests. Use a **plain (red)** discard tube when using a **butterfly needle** if the 1<sup>st</sup> tube collected is **citrate (blue)**.

Vacutainer	Adult
Blood Culture - Green	1
Blood Culture - Orange	2
Blue	3
Royal Blue, plain	4
Red	5
Gold	6
Green	7
Light Green	8
Purple	9
Royal Blue, EDTA	10
Pink	11
Grey	12

Microtainer	Paediatrics
Blood Culture - Yellow	1
Blue	2
Red	6
Gold	5
Green	3
Purple	3
Grey	4

## Urine Specimens

A random urine chemistry collection should use the screw cap containers. Please ensure the cap is secure and the container is not leaking prior to packing into biohazard ziplock bag and dispatch to the laboratory. The specimen should be dispatched to the laboratory immediately after collection.

A urine culture collection should use a sterile screw red cap container.

For a 24 hour urine collection see [24 Hour Urine Collection Guide](#) .

## Special Containers

Some tests have special requirements for tubes, swabs, containers or other materials. These may be collected from the specific laboratories indicated below during office hours

From Laboratory Administration Office (67725388):

- Orange Glucose Tolerance Beverage (Trutol®75) for OGTT for collection by wards

From CORE Laboratory (67724346):

- 24 hour urine containers, with / without preservatives (also available from Medical Centre Lab)
- Sodium heparin tubes for Fanconi Anaemia Study
- Lithium heparin tube, 10 mL for T-Spot TB
- Plain, royal blue top trace element tube for trace element analysis, e.g. Copper, Aluminium
- EDTA, royal blue-top trace element for trace element analysis, e.g. Lead
- Quantiferon tubes (grey, red, purple top) for TB serology Quantiferon
- Catecholamine tubes containing EDTA-sodium metabisulfite solution for Plasma Catecholamine Fractionation
- Filter paper blood spot card for National Newborn Screening

From Cytogenetics Laboratory (67722512):

- RPMI in 20 ml sterile container provided for CVS/POC

- RPMI in sterile falcon test tubes for bone core and solid tumours
- Sodium heparin tube is provided for cytogenetic analysis for blood and bone marrow

From Molecular Diagnosis Centre (67724384):

- Transport medium for endocervical and urethral swab specimens for *Chlamydia trachomatis* and/or *Neisseria gonorrhoeae* PCR testing
- Cervical sampler, which comprise a cervical brush and a tube containing specimen transport medium for HPV testing

## Specimen Packing and Dispatch to the Laboratory

Pack all specimens for a single patient into a biohazard kangaroo bag. Zip closed securely to ensure safe transit of the samples to the laboratory. When a request form is included, place the folded form in the outer compartment of the bag, and not within the zipped part of bag with specimens. Tests that have been requested as URGENT should be placed in a pink biohazard bag for easy visibility on receipt.

All specimens are dispatched to the laboratory as soon as possible after collection via pneumatic tube, or via porter.

All specimens will be received at CORE Laboratory reception which received all specimens for Clinical Chemistry, Haematology and Molecular Diagnosis Centre. Samples for Blood Transfusion Services and Microbiology can be delivered directly to their respective receptions or they can be left at CORE Laboratory reception and collected by the staff from the respective laboratories at a later time.

For external clients all specimens should be received by NUH Referral Laboratory during office hours.

## Specimen Packing and Dispatch to the Laboratory

- **Timely Receipt of Specimens in Laboratory**

Samples need to be delivered to the laboratory as soon as possible after collection from the patient (within 2 hours). For longer storage periods, the serum/plasma requires to be separated from the red cells and stored in fridge or freezer (see individual test recommendations).

- **Fasting specimen**

Blood should be collected at the end of an overnight fast (10-12 hours). Essential medication should still be taken with a glass of water. Tests requiring fasting specimens:

- Glucose
- Lipids
- Gastrin
- Insulin
- Parathyroid hormone
- Calcium

- **Chilled specimen during collection and transport (2°C to 8°C)**

Specimens require to be chilled to inhibit the metabolism of blood cells and to stabilize certain thermolabile constituents. Do not chill the whole blood specimen unless indicated. Place the coolant (either crushed ice or a mixture of ice and water) in the sealed section of a biohazard ziplock bag. Put this bag into a second ziplock bag with the specimen, seal bag and dispatch to the laboratory as soon as possible. The following analytes require their specimens to be chilled immediately:

- Adrenocorticotrophic Hormone (ACTH)
- Lactate
- Ammonia
- Arterial Blood Gases / Carboxyhaemoglobin / Methaemoglobin
- Molecular analysis involving mRNA extraction

- **Protected from light**

Photosensitive analytes may be degraded on exposure to direct sunlight (UV light) or artificial light. Aluminium foil or equivalent may be used to protect the following analytes:

- Folate
- Vitamin B12
- Bilirubin
- Porphyrins

- **Samples affected by diurnal variation or posture**

Collect specimens while patients are in a sitting position to prevent variation due to body posture. Ensure timed specimens are collected for analytes which show marked diurnal variation, for example ACTH and cortisol. Please ensure the correct test is ordered; cortisol 8am, for specimens collected at 8am.