UNIVERSITI KEBANGSAAN MALAYSIA
National University of Malaysia

TEST REQUEST PROCEDURE

Medical Laboratories Guidelines

Jabatan Perkhidmatan Makmal Diagnostik,
Hospital Canselor Tuanku Muhriz,
Pusat Perubatan Universiti Kebangsaan Malaysia.

Version 1, May 2018

PREFACE

This Test Request Procedure is developed through consensus by committees which comprise balanced representation of Clinicians, Pathologists, officers and others with relevant interests as may be appropriate to the subject at hand. It is meant to be a comprehensive guide for House Officer, Medical Officer and all Clinician in making laboratory test requests at JPMD.

This guideline includes the laboratory services offered at Chemical Pathology, Hematology, Blood Bank, Specialized Hemostasis, Stem Cell Transplant, Molecular Genetics, Molecular Biology, Bacteriology, Virology-Serology, Immunology, Mycology and Tissue Culture.

It is important to understand the indications of each test before test requests are sent to the laboratory to avoid rejection and patient difficulty. Understanding this will help to ensure the implementation of this guideline achieved its goals. It is also expected to improve the quality of service to customers in line with the slogan 'Better, Faster and Friendlier (BFF)'.

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TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: CHEMICAL PATHOLOGY

GENERAL RULE:

1. **All test request must include relevant clinical history and diagnosis.**
2. Please ensure that the test request is appropriate with the working diagnosis.
3. Should there be any deviation from the Clinical Practice Guideline (CPG) / other guideline due to special circumstances, the attending doctors are required to discuss with Chemical Pathology MO/ Chemical Pathologist on call to avoid any rejection of request and it is a case by case basis.

No.	Test	Indication	Description	Requester	Source/Rationale
	Routine Test				
1.	Renal profile (RP)	1. Renal profile includes sodium, potassium, urea and creatinine. 2. Request for serum **chloride** must be stated if clinically indicated. **(Individual test).** 3. **ONLY** renal profile being offered during oncall.		HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group. • Clinical Knowledge Summary. • Hypertension-not diabetic. NICE, 2014. • Guidelines and Audit Implementation Network. Hyponatremia in Adults. GAIN, 2010. • UK Renal Association. Clinical Practice Guideline, Acute Kidney Injury, 5th Edition. Renal

No.	Test	Indication	Description	Requester	Source/Rationale
					Association: Hampshire, 2011.
2.	Liver function test (LFT)	1. **LFT** consist of **Total protein, albumin, ALT, ALP** and **total bilirubin.** 2. **NO LFT** offer after 10 pm except from Emergency Department and ICU/CCU/HDU.		HO/ MO/ Specialist	• Smellie S, Galloway M, McNulty S. Primary Care and Laboratory Medicine, Frequently Asked Questions. London: ACB Venture Publications, 2011. • Consensus opinion of the relevant expert working group.
3.	Calcium, magnesium, and phosphate	1. **WILL NOT BE OFFERED** as routine test for **MEDICAL CHECK-UP** or as **SCREENING** with **no clear justification**. 2. Relevant diagnosis is a **MUST**.		HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
4.	Serum and urine osmolality	1. Clear/ relevant indication and diagnosis. 2. Test offered 24 hours.		HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
	Specialised Test				
5.	HbA1c	1. Diabetes patient with good glycaemic control (HbA1c<**7.0**-7.5%) the interval for retesting is 6 months. 2. For poor glycaemic control (HbA1c> 7.5 % the interval for retesting is 3 months.	• Test will only be run thrice weekly i.e. Mon, Wed and Fri • TAT : 3 working days	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group. • Malaysian CPG 2017 Management of type 2 DM

No.	Test	Indication	Description	Requester	Source/Rationale
		3. Not indicated during acute illness. 4. This suggestion **NOT** subjected for GDM and Paeds population.			
6.	Anemia profile	1. Ferritin based strategy.	• Ferritin < normal range (according to age and gender) - test for iron and Transferrin is not done. • Ferritin within normal range – Iron and Transferrin as a reflect testing. • Ferritin > normal range (according to age and gender), iron and Transferrin is not done unless in a case of:- (i)TRO functional anemia (ii)TRO primary haemachromatosis • **Ferritin : batching, requests will be subjected to screening ; TAT – 3 days UIB** • Beta Thalassemia : 3 monthly with appropriate	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.

No.	Test	Indication	Description	Requester	Source/Rationale
			clinical indication.		
		2. Full Iron studies (Ferritin, Iron, Transferrin)	• ESRD on CAPD/HD minimal retesting is 6 months. Shorter interval required relevant clinical justification. • IVI Supplementation • Test request is not relevant for patient with history of recent blood transfusion		
7.	Vitamin B12 and Folate	1. Clear/relevant indication and diagnosis. 2. **Not for patients with established IDA** 3. Screening of the request by SO/MO	• The analysis in batching; TAT 3 working days	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
8.	Thyroid function test (TFT)	1. Every TFT request **MUST** include relevant clinical history and diagnosis. 2. **PLEASE AVOID** request for TFT in critically ill patient without relevant justification.	• Suggested Protocol for TFT: Please refer **Appendix A**	MO/ Specialist	• National minimum retesting intervals in pathology: A final report detailing consensus recommendations for minimum retesting intervals for use in pathology. • The Royal College of Pathologists, www.rcpath.org.

No.	Test	Indication	Description	Requester	Source/Rationale
					• The Association for Clinical Biochemistry and Laboratory Medicine, www.acb.org.uk • The Institute of Biomedical Science, www.ibms.org • Penang Hospital Consensus
9.	**Tumour marker** PSA CEA CA 125 HCG AFP CA 19-9	1. **ONLY** request by **SPECIALIST** with clear/relevant indication and diagnosis. 2. **ONLY** for monitoring of tumour progress. 3. **NOT** for screening/ medical check-up. 4. CA-125 is not offered for male patient and PSA is not offered for female patient. 5. Indication for multiple markers: ● Clear justification in situation of multiple masses in the abdomen or bone metastases. ● Limit only 4 tumour marker at one time. ● Tumour marker test must be specified. ● Written request for 'Tumour markers' in the request form will be rejected.	• The test offered during weekdays (office hours).	Specialist	• The National Academy of Clinical Biochemistry. • Laboratory Medicine Practice Guidelines use of Tumour Markers in Clinical Practice .Quality Requirements. Clin. Chem. 2008; 54: 1935-1939 • Penang Hospital Consensus

No.	Test	Indication	Description	Requester	Source/Rationale
10.	Cardiac marker	1. Test request must be from **ED/CCU/CRW/HDW/ ALL ICU** and requester are MO or ED Physician/Cardio MO/Cardiologist/ Anaest with appropriate clinical history. 2. Request of cardiac marker from other ward must call Chemical Pathology MO oncall for permission (clinically indicated). 3. **Patients with established Dx of ACS: Not for monitoring with hs-Trop I.** 4. **CK-MB only indicated in pts with re-infarction and rhabdomyolysis.** **LDH: No longer cardiac marker.**	• As the test offered is high sensitivity Troponin I- the suggested interval is 0 hr, 3 hrs, and 6 hrs onset chest pain.	MO/ Specialist	• Hamm CW, Bassand JP, Agewall S, Bax J, Boersma E, Bueno H et al. ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. Eur Heart J 2011; 32:2999–3054. • Hospital Tengku Ampuan Afzan Consensus
11.	**Special hormone** FSH LH Prolactin Progesterone Estradiol Cortisol	1. **ONLY** request by **MO/SPECIALIST** with clear/relevant indication and diagnosis. 2. Request from HO is **NOT ACCEPTED**. 3. For fertility hormone request, LMP should be provided. 4. For cortisol, request **MUST** include: ● Relevant clinical history suggesting of eg: Cushing syndrome or TRO	• Please document time of sample taken for AM and PM cortisol. • Limitation for cortisol test: Please justify before sending the request. • False elevation in pregnancy, contraceptives pill users, estrogen therapy patient, and	MO/ Specialist	• Goodman NF, Cobin RH, Ginzburg SB, Katz IA, Woode DE. American Association of Clinical Endocrinologists medical guidelines for clinical practice for the diagnosis and treatment of menopause. Endocr Pract. 2011; 17(Suppl 6):1–25. • NICE. Fertility problems: assessment and treatment.

No.	Test	Indication	Description	Requester	Source/Rationale
		Primary Adrenal Insufficiency (PAI). ● Only request by **SPECIALIST/ MO-COUNTERSIGN BY SPECIALIST.** ● Random cortisol is not offered. If there is indication eg: (to exclude hypocortisolism), please contact Chemical Pathology MO oncall.	patient with prednisolone, 6-a-methylprednisolone/ prednisone, metyrapon treatment. • For patients on prednisolone treatment, treatment should stopped 48 hours before cortisol measurement.		NICE, 2013. www.nice.org.uk/guidance/cg156 • Melmed S, Casanueva FF, Hoffman AR, Kleinberg DL, Montori VM, Schlechte JA et al. Diagnosis and treatment of hyperprolactinemia: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab 2011; 96:273–288. • Stefan R. Bornstein , Bruno Allolio, Wiebke Arlt, Andreas Barthel, Andrew Don-Wauchope, Gary D. Hammer, Eystein S. Husebye, Deborah P. Merke, M. Hassan Murad, Constantine A. Stratakis, and David J. Torpy. Diagnosis and Treatment of Primary Adrenal Insufficiency: An Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab 101: 364 –389, 2016. • Lynnette K. Nieman, Beverly M. K. Biller, James W. Findling, John Newell-Price, Martin O. Savage,Paul M.

No.	Test	Indication	Description	Requester	Source/Rationale
					Stewart, and Victor M. Montori. The Diagnosis of Cushing's Syndrome: An Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab 93: 1526 –1540, 2008.
12.	Clinical toxicology	1. Should provide relevant clinical history and diagnosis. 2. Only serum for acetaminophen, salicylate and benzodiazepine are offered 24 hours.		MO/ Specialist	• Consensus opinion of the relevant expert working group.
13.	Protein electrophoresis	1. Clear/ Relevant indication/ diagnosis pointing to multiple myeloma/ paraprotein related problem. 2. **MUST** provide other relevant investigation eg: FBP, ESR, Ca, BM Aspiration finding. 3. Not for screening in patients with CKD as sFLC is not offered by JPMD.	• Minimal retesting interval is 3 months.	Specialist / MO-countersign by Specialist	• National minimum retesting intervals in pathology: A final report detailing consensus recommendations for minimum retesting intervals for use in pathology. The Royal College of Pathologists, www.rcpath.org • The Association for Clinical Biochemistry and Laboratory Medicine, www.acb.org.uk • The Institute of Biomedical Science, www.ibms.org • The National Academy of Clinical Biochemistry: Laboratory Medicine Practice Guidelines use of Tumour Markers in Clinical Practice

No.	Test	Indication	Description	Requester	Source/Rationale
					.Quality Requirements. Clin Chem 2008; 54: 1935-1939
14.	Procalcitonin	1. Clear/ Relevant indication/ diagnosis is a MUST. 2. Test request must be from **HDU/ <u>ALL ICU.</u>** **3. Other ward/ clinic: if there is indication (eg: patient with prolong fever) please contact Chemical Pathology MO oncall.** 4. Retesting – 24 hours	• CRP is recommended as first line screening for sepsis.	Specialist / MO-countersign by Specialist	• Hochreiter et al, Crit Care 2009;13:R83 • Seguela et al, Cardiology in the Young 2011; 21: 392-399
	Urine Test				
15.	UFEME	1. Clear/ relevant indication and diagnosis. 2. Only offer during office hour. 3. Weekend: Only offer on Saturday up to 12 noon.		HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
16.	24-hrs urine testing	1. Please ensure the correct collection methods. 2. Volume < 500 mls will be rejected except in case of paediatric patient/ CKD.		HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.

Appendix A

No.	Clinical Condition	First line TFT offered
1.	TRO primary Hyperthyroidism	TSH, FT4
2.	TRO primary Hypothyroidism	TSH, FT4
3.	Known case of primary Hypothyroidism on thyroxine replacement.	TSH, FT4
4.	Congenital Hypothyroidism (> 12 years old)	TSH, FT4
5.	Primary Hyperthyroidism in remission	TSH, FT4
6.	Post thyroidectomy	TSH, FT4
7.	Post RAI not on treatment	TSH, FT4
8.	Known case of primary hyperthyroidism on anti-thyroid treatment	TSH, FT4
9.	Post RAI on anti-thyroid medication or uncertain status	TSH, FT4
10.	Thyroid carcinoma follow-up	TSH, FT4
11.	All pregnant lady (screening and known thyroid disorders)	TSH, FT4
12.	All peadiatric patients <12 years	TSH, FT4
13.	TRO central hypothyroidism	FT4
14.	Known case of central hypothyroidism	FT4
15.	Known case of T3 toxicosis on treatment	TSH, FT4,FT3

Reflect testing

Applicable for patient with:

a. If TSH result is abnormal < 0.270 mIU/L or > 4.200 mIU/L = FT4 will be provided.

b. If TSH < 0.01 mIU/L and a normal FT4 = FT3 will be provided.

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: HAEMATOLOGY

GENERAL RULE:

1. All test requests must include relevant clinical history and diagnosis.
2. Please ensure that the test request is appropriate with the working diagnosis.

<table>
<tr><th>No.</th><th>Test</th><th>Indication</th><th>Description</th><th>Requester</th><th>Source/Rationale</th></tr>
<tr><td colspan="6">Routine Test</td></tr>
<tr><td>1.</td><td>Full Blood Count (FBC) and Reticulocytes Count</td><td>1. Interval repeat within 24 hours would be indicated on clinical grounds if there were a significant change in that patient's condition. A clinical or diagnostic summary should be completed.</td><td>• Refer Panduan Perkhidmatan Makmal JPMD.</td><td>HO/ MO/ Specialist</td><td>• Consensus opinion of the relevant expert working group.</td></tr>
<tr><td>2.</td><td>Coagulation Test

-PT/INR
-APTT
-DIVC
-D Dimer
-Fibrinogen
-TT</td><td>1. Indication test for PT / INR / APTT is for cases with a risk of bleeding/ bleeding disorder or patients treated with anticoagulation medicines.

2. PT / INR / APTT is not a routine test.

<table><tr><th>Indication</th><th>Test</th></tr><tr><td>Warfarin Therapy Control</td><td>PT, INR</td></tr><tr><td>Heparin Therapy Control</td><td>APTT</td></tr><tr><td>DIVC Screen</td><td>PT, APTT</td></tr><tr><td>Liver Biopsy</td><td>PT, APTT</td></tr><tr><td>Pre-operative cases</td><td>PT, APTT</td></tr></table></td><td>• Applications with no clinical indication and incomplete forms will be rejected.

• If results are abnormal or if there are any doubts, the attending doctor should consult the Pathologist/ MO. Full coagulation studies will then be arranged if indicated.</td><td>HO/ MO/ Specialist</td><td>• Consensus opinion of the relevant expert working group.</td></tr>
</table>

No.	Test	Indication	Description	Requester	Source/Rationale
3.	G6PD Screening	1. Newborn screening for G6PD deficiency is performed routinely in Malaysia because of our high disease prevalence.	• Samples sent after office hours (weekdays), testing will be conducted on the following day. • Samples sent on weekends and public holidays must be sent before 12pm. Samples sent after 12pm, testing will be conducted on the following day.	HO/ MO/ Specialist	• Guideline G6PD Screening in newborn. http://www.my.health.gov.my/en/g6pd-screeningscreening-newborn/
	Specialised Test				
4.	Full Blood Picture (FBP)	1. Relevant clinical history must be included in the request form. 2. If the patient is hospitalized and FBC is flagged almost everyday, daily FBP is not indicated. In this case FBP can be sent twice a week.	• Refer Panduan Perkhidmatan Makmal JPMD	HO/ MO/ Specialist	• Guidelines for FBP request in Panduan Perkhidmatan Makmal JPMD.
5.	G6PD Enzyme Level	1. Indication for G6PD Enzyme Level : a) Discrepancy cases b) Female patients with intermediate enzyme activity	• Limitation for G6PD Enzyme Level is acute haemolysis & reticulocytosis because it can cause false normal result in a G6PD deficient patient. Suggest to repeat the test 3 months later	HO/ MO/ Specialist	• Guideline G6PD Screening in newborn. http://www.my.health.gov.my/en/g6pd-screeningscreening-newborn/

No.	Test	Indication	Description	Requester	Source/Rationale
			when reticulocyte count back to normal/ haemolysis resolves. ● Tests carried out in 'batches'. ● Stability of sample is 3 days at 2-8^{0}C		
6.	Hemoglobin Analysis Screening test	1. Request for Hemoglobin Analysis Screening without clinical information and FBP report will be rejected. 2. All patients with MCH < 27pg should be screened for thalassaemia. 3. For cases other than this must be justified with relevant clinical history (iron/ ferritin study must be performed for cases of hypochromic anaemia with Hb <11g / dl). 4. Repeat testing is not indicated.	● Refer Panduan Perkhidmatan Makmal JPMD	HO/ MO/ Specialist	● Management Of Transfusion Dependent Thalassaemia: Quick Reference For Health Care Providers http://www.moh.gov.my/penerbitan/CPG2017/4657.pdf
7.	Bone Marrow Aspirate (BMA)	1. Relevant clinical history must be included in the request form.	● BMA procedure is by appointment at least a day before.	Specialist	● ICSH guidelines for the standardization of bone marrow specimens and reports. Int. Jnl. Lab. Hem. 2008, 30, 349–364
8.	Leukemia and Lymphoma	1. Request for immunophenotyping must be clinically indicated and relevant clinical history.	● Refer Panduan Perkhidmatan Makmal JPMD	Specialist	● Guidelines on the use of multicolour flow cytometry in the diagnosis of

No.	Test	Indication	Description	Requester	Source/Rationale
	Immunophenotyping				haematological neoplasma. British Journal of Haematology, 2014,165,455-488
9.	Paroxysmal Nocturnal Hemoglobinuria **(PNH)**	1. Request for PNH must be clinically indicated and relevant clinical history.	● Refer Panduan Perkhidmatan Makmal JPMD	HO/ MO/ Specialist	● Consensus opinion of the relevant expert working group.
10.	CD4CD8 & Lymphocytes Subset	1. Relevant clinical history must be included in the request form.	● Request for CD4CD8 test only on Tuesday (working hours). ● Appointment for Lymphocytes Subset test must be made at least a day before.	HO/ MO/ Specialist	● Consensus opinion of the relevant expert working group.

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: MOLECULAR GENETICS

GENERAL RULE:

1. All test requested must include relevant clinical history and diagnosis.
2. All requested samples must be consented by patients.
3. Please ensure that the test request is appropriate with the working diagnosis.
4. All the tests are run in batches.

No.	Test	Indication	Description	Requester	Source/Rationale
	Specialised Test				
1.	Jak2 V617F	1. All new cases of Myeloproliferative Neoplasms (MPN). Suggestion for : ● Bone Marrow Disorder ● Polycythemia Vera ● Essential Thrombocytopenia ● Primary Myelofibrosis ● Chronic Eosinophilic Leukemia ● Chronic Neutrophilic Leukemia ● Myelodisplastic Syndromes ● Chronic Myeloid Leukemia	• Refer Panduan Perkhidmatan Makmal JPMD	MO/ Specialist	• The Korean Journal of Internal Medicine Vol. 30, No. 6, November 2015: Guidelines for the management of myeloproliferative neoplasms.
2.	Alpha Thalassaemia	1. Patients with thalassaemic red cells parameters (Serum Iron, TIBC and Hb Analysis are normal). 2. Family history of Alpha Thalassaemia	• Special requirement: FBC, SERUM IRON AND TIBC,HB ANALYSIS – DONE • Non-deletional thalassaemia	MO/ Specialist	• European Journal Of Human Genetics (2015) 23, 426-437: Best Practice Guidelines For

No.	Test	Indication	Description	Requester	Source/Rationale
		3. Prenatal testing using amniotic fluids (appointment should be made before send the sample to the lab) Suggestion for : ● Anaemia with thalassaemic indices ● Family screening	analysis – pathologist will decide. • Refer Panduan Perkhidmatan Makmal JPMD		Molecular And Haematology Methods For Carrier Identification And Prenatal Diagnosis Of The Haemoglobinopathies.
3.	BCR-ABL (RT-PCR)	1. All new cases of Acute Leukaemia and Myeloproliferative Neoplasms. 2. Repeated samples that positive with BCR-ABL at diagnosis. 3. All relapse cases of Acute Leukaemia Suggestion for : ● Acute Lymphoid Leukemia (ALL) ● Acute Myeloid Leukemia (AML) ● Chronic Eosinophilic Leukemia (CEL) ● Chronic Myeloid Leukemia (CML) ● Chronic Myeloid Monocytic Leukemia (CMML) ● Chronic Neutrophilic Leukemia (CNL) ● Essential Thrombocytosis (ET) ● Juvenile Myeloid Monocytic Leukemia (JMML) ● Myelodysplastic Syndrome (MDS) ● Myeloproliferative Neoplasms (MPN) ● Myelofibrosis (MF) ● Mastocytosis ● Polycythaemia Rubra Vera (PRV)	• Refer Panduan Perkhidmatan Makmal JPMD	MO/ Specialist	• Pharmacotherapy 2010; 30 (9 Pt 2):77S–101S: Current and Future Clinical Strategies in the Management of Chronic Myeloid Leukemia.

No.	Test	Indication	Description	Requester	Source/Rationale
4.	Chimerism Analysis For Allogeneic Transplant (STR)	1. Donor and recipient who undergo stem cell transplantation (pre-transplant samples should send samples together) 2. Repeated samples (post transplant) within period of 1 month, 3 month, 6 month & 12 month.	• Refer Panduan Perkhidmatan Makmal JPMD	MO/ Specialist	• Biology of Blood and Marrow Transplantation 7:473-485 (2001), American Society for Blood and Marrow Transplantation: Establishment of Complete and Mixed Donor Chimerism After Allogeneic Lymphohematopoietic Transplantation: Recommendations From a Workshop at the 2001 Tandem Meetings.
5.	Hla Typing (Pcr Class I & Pcr Class II)	1. New samples for pre-transplant donor and recipient only. Suggestion for : ●Stem cell transplant ●Renal transplant	• Refer Panduan Perkhidmatan Makmal JPMD	MO/ Specialist	• International Journal of Immunogenetics, 2016, 43, 263–286: BSHI Guideline: HLA matching and donor selection for haematopoietic progenitor cell transplantation.

REFERENCES

1. American College of Medical Genetics, Standards and Guidelines for Clinical Genetics Laboratories, *2008 Edition.*
2. Malaysian J Pathol 2015; 37(2): 165 – 173, Guidelines for nucleic acid detection and analysis in hematological disorders.
3. Clinical and Laboratory Standards Institute of USA - Nucleic Acid Amplification Assays for Molecular Haematopathology: Approved Guideline, 2nd Edition.
4. National Pathology Accreditation Advisory Council of Australia - Laboratory Accreditation Standards and Guidelines for Nucleic Acid Detection and Analysis.
5. Panduan Perkhidmatan Makmal Diagnostik (http://www.ppukm.ukm.my/diagnostik/)

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: <u>STEM CELL TRANSPLANT</u>

GENERAL RULE:

1. The specimen (fresh peripheral blood, apheresis products and cord blood) should be collected in EDTA tube.
2. Minimum volume of specimen required: 1 ml
3. The specimens are accepted only on the date of appointment.
4. The specimen information should at least has two unique identifications (name and identity card / passport or MRN)
5. The state of the specimen - no haemolysis / clotted / clumped
6. Date and time of specimen taking
7. Applicant information: name/signature and stamp
8. Type of examination requested
9. The specimen will be stored in the refrigerator (2°C - 8°C) for 1 day after the test is completed.
10. Specimen MUST be sent to the lab within 8 hour from the time of collection. Specimen should be stored and transported with ice pack if the samples from the outside of UKMMC.
11. The test period for this test is 24 hours.

No.	Test	Indication	Description	Requester	Source/Rationale
	Specialised Test				
1.	$CD34^+$ Cells Count	1. To start initiation of PBSC collection when; • **WBC count in peripheral blood >3.0x10^9/L** • **Peripheral $CD34^+$ cell count >15/uL (>10/uL for poor mobilizer)**	• $CD34^+$ cell count and start of harvesting will only be done during office hours, as scheduled in the protocol (except for certain circumstances of patient, but with the agreement from lab and ward).	Specialist	• Duong et al. *Peripheral Blood Progenitor Cell Mobilization for Autologous and Allogeneic Hematopoietic Cell Transplantation: Guideline from the American Society of Blood and Marrow Transplantation*. Biology of

No.	Test	Indication	Description	Requester	Source/Rationale
		2. Target total PBSC $CD34^+$ doses for collection: **≥ 5-8x10^6 $CD34^+$ cells /kg**	• The target of PBSC $CD34^+$ must be stated in the harvesting protocol and the dose must be disease dependent.		Blood and Marrow Transplantation 20(2014) 1262-1273. • Although 2x10^6 $CD34^+$ cells/kg is generally accepted as the minimum goal, successful transplantation has occurred at much lower doses. In the setting of matched sibling donor transplants, some studies have shown increased risk for extensive chronic GVHD with $CD34^+$ cell doses above 8 x10^6 $CD34^+$ cells/kg.
2.	Peripheral Blood Stem Cell Processing and Cryopreservation	Cryopreserved stem cell and donor lymphocytes have to be transferred to PTS when the patients had passed away.	• Pusat Terapi Sel (PTS) is required to provide the list of patients who have expired every 6 months. • PTS need to store the products according to patients/ donors preferences as stated in the consent form (discard/ research purposes/ stored with fee).	Specialist	• Very limited spaces are currently available in the storage tanks • To allow ample and better storage for future harvested stem cell products. • Help reduce the cost of maintenance for the liquid nitrogen freezer.

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: <u>SPECIALIZED HAEMOSTASIS</u>

GENERAL RULE:

1. Specimen Collection Guidelines:
    a. For haemostasis tests, venous blood sample should be obtained by clean venepuncture at a site away from an intravenous line.
    b. During blood collection, use light pressure using a tourniquet and avoid prolonged application (if possible < 1 minute). Avoid slow-flowing draws and/ or traumatic venepunctures (as a guideline, 19-21 gauge needles)
    c. Use citrated-based anticoagulant tube 109mM, 3.2% (Sodium Citrate). Tubes should be adequately filled (to the mark noted on the tube).
    d. Sample should be mixed thoroughly with the anticoagulant by inverting the blood container several times (as a guideline, 6 inversions).
    e. The container must be brought to the lab as soon as possible and processed/ tested within 3 hours after blood sampling

2. Specimen Rejection:
    The specimen will not be accepted and rejected for testing if:

    a. Specimen lysed.
    b. Patient information on the sample is not the same as the patient information on the request form.
    c. Using wrong request form.
    d. Using wrong tube or specimen.
    e. Specimens received in the laboratory for more than 3 hours after blood sampling.
    f. The service is not offered in the Specialized Haemostasis Unit.
    g. Sending test specimen not within the designated service operation hours (after 5.00pm).
    h. No appointment was made for tests that needs one. (For Platelet Function Test).
    i. Incomplete form (Ensure requests are filled with date, time, tests requested, name/signature & doctor's stamp, ward/clinic destination and clinical summary/diagnosis).
    j. Not enough specimen volume for testing (minimum 2.7ml or by volume set on the tube).
    k. Patients were on treatment 'anticoagulant' such as warfarin (for Protein C, Protein S and APCR test) or heparin (only for ATIII test).
    l. Repeated requests (Duplicate). (Samples received within TAT).
    m. Frozen specimen.
    n. Specimen send to laboratory outside UKMMC in the form of:
        i) "Whole Blood"

ii) Plasma samples were shipped without ice box and ice pack / dry

o. Request a test that is not related to the patient diagnosis.

No.	Test	Indication	Description	Requester	Source/Rationale
	Specialised Test				
A.	**Special Coagulation**				
1.	Factor VIII Assay	1. Specific assays of individual clotting factors are used to: ● Diagnose deficiencies of one or more coagulation factors in patients with suspected inherited or acquired bleeding disorders. ● Investigate the cause of a prolonged PT or APTT. 2. Monitor the factor levels in patients given specific factor replacement therapy		MO/ Specialist	• Consensus opinion of the relevant expert working group.
2.	Factor IX Assay				
3.	Factor VIII Inhibitor	1. For patients with existing inhibitors, changes in inhibitor titre during tolerization can also be monitored	• To quantitate inhibitors (antibodies) to coagulation factor VIII / IX. Factor VIII / IX inhibitors are antibodies that bind to, and neutralize the pro-coagulant plasma protein Factor VIII / IX. They can be allo-antibodies, as in people with Haemophilia A, or auto-antibodies in non-haemophiliac people	MO/ Specialist	
4.	Factor IX Inhibitor				

No.	Test	Indication	Description	Requester	Source/Rationale
5.	Factor XIII Screening Test	1. The test is used in the investigation of a bleeding disorder.	• Although the prevalence of congenital factor XIII deficiencies has not been accurately assessed, they are not infrequent.	MO/ Specialist	• Consensus opinion of the relevant expert working group.
6.	APTT 2 Hours Incubation Mixing	1. The mixing test is used in the initial investigation of a prolonged APTT.	• The mixing test differentiates between the presence of time-dependent inhibitor or other inhibitors.	MO/ Specialist	• Consensus opinion of the relevant expert working group.
7.	Platelet Aggregation Test	1. To detect the presence of anti-platelet drugs such as aspirin.	• Platelet aggregation studies are used to detect inherited and acquired defects of platelet function and von Willebrand factor.		
8.	Von Willebrand Disease (VWF Antigen + Collagen Binding Assay + Ristocetin Cofactor Assay + Factor VIII)	1. Relevant clinical history must be included in the request form	• Von Willebrand Disease (VWD) is the most common inherited bleeding disorder. It results from quantitative deficiencies and/or qualitative defects in von Willebrand factor (VWF.Measurement of VWF:Ag is one of a panel of tests used to diagnose von Willebrand Disease. • The collagen binding activity assay is one component of a von Willebrand screen. When interpreted in conjunction with		

No.	Test	Indication	Description	Requester	Source/Rationale
			the VWF antigen, the ristocetin assay and FVIII:C the VWF:CB assists in the detection of, and subtyping, of von Willebrand disease (VWD). • The ristocetin cofactor assay is one component of a von Willebrand screen. When interpreted in conjunction with the VWF antigen, collagen binding assay and FVIII:C the ristocetin cofactor assay assists in the detection of, and subtyping of, von Willebrand disease (VWD).		
B.	**Thrombophilia** (By appointment only. To call MO before requesting)				
9.	Protein C Activity	1. Detection of reduced functional Protein C / Protein S / ATIII.	• The chromogenic Protein C/ Protein S / ATIII assay is used for all Protein C / Protein S / ATIII requests ordered individually or as part of a thrombophilia screen.	MO/ Specialist	• Consensus opinion of the relevant expert working group.
10.	Protein S Activity				
11.	Anti Thrombin III Activity	1. Relevant clinical history must be included in the request form.	• The chromogenic antithrombin assay is used for all antithrombin III requests ordered individually or as part of a thrombophilia screen.		

No.	Test	Indication	Description	Requester	Source/Rationale
12.	Activated Protein C Resistance (APCR)	1. This clotting based test is used to screen for the presence of the Factor V Leiden mutation. If the result of the clotting suggests FVL is present, it is recommended that the DNA test be performed for confirmation, and to determine zygosity.	• This assay is used for all APC resistance requests ordered individually or as part of a thrombophilia screen.		
C.	**Anti Phospholipid Screening (APLS)**				
13.	Anti Cardiolipin IgM	1. APLS is present if at least one of the criteria is met. • Vascular thrombosis • Pregnancy morbidity	• Refer Panduan Perkhidmatan Makmal JPMD	MO/ Specialist	• UKMMC Guideline based on our local policy. • Recommended by British Committee for Standards in Haematology (BCSH). Reference: BJH Guideline 2012. • Guidelines on the investigation and management of antiphospholipid syndrome (Revised guideline 2012 from previous guideline in 2000). • As recommended by the Nephrology team UKMMC based on our local policy.
14.	Anti Cardiolipin IgG	• If aCL antibody of IgG and/or IgM isotype, present in medium or high titre, repeated test request must be at least 12 weeks apart			
15.	Anti Beta 2 Glycoprotein 1 IgG	• If Anti-β2-glycoprotein I antibody of IgG and/ or IgM isotype, present on two or more occasions, repeated test request must be at least 12 weeks apart			
16.	Anti Beta 2 Glycoprotein 1 IgM				
17.	Lupus Anticoagulant Test Panel	• If LA present in plasma, there must be 12 weeks interval before the next test			

No.	Test	Indication	Description	Requester	Source/Rationale
		request *****For APLS repeat test after 12 weeks must be countersign by specialist before sending request form to lab.**			
D.	**Heparin**				
18.	Anti Xa Assay - Low Molecular Weight Heparin (LMWH)	1. A low molecular weight heparin (Clexane) given to anticoagulate patients at risk of thrombosis.	• The APTT is relatively insensitive to plasma LMWH, the quantitative determination of plasma heparin requires measurement of its anti-Xa activity. The majority of patients receiving LMWH do not require monitoring, unless a complicating factor, such as renal impairment makes, the response to a given dose unpredictable.	MO/ Specialist	• Consensus opinion of the relevant expert working group.
19.	Heparin Induced Thrombocytopenia (HIT)	1. The test reveals detectable antibodies to the heparin-PF4 complex.	• Between 1-5% of patients receiving heparin will develop Type II heparin-induced thrombocytopenia (HIT), due to production of antibodies against a complex consisting of heparin and platelet factor 4 (PF4). This leads to a significant drop in platelet count and the risk of thromboembolic complications.		

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: <u>BLOOD BANK</u>

GENERAL RULE:

1. All test request must include relevant clinical history and diagnosis.
2. For all Blood bank testing, the sample and request form must be checked and initial by the medical personnel who took and labelled the sample.

No.	Test	Indication	Description	Requester	Source/Rationale
	Routine Test				
1.	Blood & Blood component request	1. **RBC**: no need MO code except during blood shortage. 2. **Blood component**: need MO code - FFP / CRYO / Random Platelet - Platelet Apheresis *Borang Pengambilan Darah (PPUKM/RP200/2007 dan PPUKM/RP201/2007)* must be signed by Doctor and only collect the blood and component when the patient is ready for transfusion (Transfusion must be initiated within 30 min after issued out from blood bank).		At least HO	• Transfusion Practice Guidelines for Clinical and Laboratory Personnel, 4th Edition 2016. • Panduan Perkhidmatan Makmal JPMD
2.	Cross matching (GXM)	1. For elective cases refer to PPUKM MSBOS Guideline		At least HO	• Transfusion Practice Guidelines for Clinical and Laboratory

No.	Test	Indication	Description	Requester	Source/Rationale
		***** Valid For 2 Days**			Personnel, 4th Edition 2016 (ensure CT ration ≤ 2:1). • Maximum Surgical Blood Order Schedule (MSBOS) For Elective Surgery, 4th Edition, 2016.
3.	Group, Screen & Hold (GSH)	1. For elective cases refer to PPUKM MSBOS Guideline. 2. GSH convert to GXM is ONLY applicable to emergency cases. ***** Valid For 2 Days**		At least HO	• Transfusion Practice Guidelines for Clinical and Laboratory Personnel, 4th Edition 2016 (ensure CT ration ≤ 2:1). • Maximum Surgical Blood Order Schedule (MSBOS) For Elective Surgery, 4th Edition, 2016.
4.	Direct Coombs Test	1. Newborn with suspected HDFN. 2. AIHA 3. Drug induced HA ***** (2) & (3) only offered during Office hours. Any urgent request during on call must get permission from MO on**		At least HO	• Investigation of (2) & (3) may involve complicated and laborious lab test. • During on call hours, the number of staff on duty is limited and need to concentrate on more important and urgent lab test.

No.	Test	Indication	Description	Requester	Source/Rationale
		duty (Blood Bank).			
5.	Indirect Coombs Test	1. Antibody Screening for : • antenatal screening (1st booking) • elective surgery (booking for OP) ***** Only offer during office hours.**		At least HO	• Indirect coombs test request after office hours will be packaged in GSH/GXM.
6.	Blood Grouping (adult / newborn)	1. Only offer during office hours except for: • Newborn • patient with no previous blood group result for component request.		At least HO	• Blood component for transfusion is given according to patient's blood group.
	Specialised Test				
7.	Full Antibody Identification	1. For cases with positive indirect coombs test (include GXM & GSH). 2. Require new request (sample and form).		At least MO	
8.	RBC Phenotyping	1. Newly diagnosed transfusion dependant cases eg: • thalassemia major / intermediate • patient before starting on Daratumumad (anti-CD38) ***** Only Office hours**		At least MO	
9.	Rh Phenotyping	1. Suggest for Rh D negative patient		At least MO	
10.	Cold Agglutinin	1. Suggest for cold AIHA cases only • Must get permission from MO (Blood Bank).		At least MO Need	• The test procedure is laborious and time consuming

No.	Test	Indication	Description	Requester	Source/Rationale
		• By appointment and office hours only.		Appointment	• MO can discuss with specialist after getting the appointment.
11.	ISO Haemagglutinin	1. For cases with ABO mismatch Stem cell transplant. 2. For patients with suspected congenital immunodeficiency • Must get permission from MO (Blood Bank) • By appointment and office hours only.		At least MO Need Appointment	• The test procedure is laborious and time consuming. • MO can discuss with specialist after getting the appointment.
12.	Transfusion Reaction	1. For patients suspected with transfusion reaction only. 2. If requested, clinician must fill in reporting form for transfusion related adverse event (BTS/HV/3/2016), MOH and return to BB within 2 weeks after receiving the form.		At least MO	• Transfusion Practice Guidelines for Clinical and Laboratory Personnel, 4th Edition 2016.
13.	Anti-D titre	1. For Rh D negative patient with immune anti-D. • Must get permission from MO (Blood Bank) • By appointment and office hours only.		At least MO	
14.	Full AIHA Ix	1. For cases with positive DCT • Must get permission from MO (Blood Bank) • By appointment and office hours only.		At least MO	

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: BACTERIOLOGY

GENERAL RULE:

1. All specimens must be transported to the lab as soon as possible in the appropriate containers.
2. Please specify type of specimens and note the date and time of collection in requested forms. Specimens that have been in transit for inordinate period of time may not be acceptable for microbiological analysis.
3. Please provide relevant clinical information and current antibiotics used in the treatment.

No.	Test	Indication	Description	Requester	Source/Rationale
	Routine Test				
1.	Abscess/ pus C&S	1. Infections from wounds, abscesses, burns and draining sinuses.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
2.	Blood C&S	1. Blood culture is required when bacteraemia (septicaemia) is suspected.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom. • Manual BACTEC
3.	Body fluid	1. Relevant clinical history must be included in the request form.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District

No.	Test	Indication	Description	Requester	Source/Rationale
					Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
4.	Catheter tip	1. Intravascular catheter-related infections.		HO/ MO/ Specialist	• Isenberg, H.D. 2004. Aerobic Bacteriology. Clinical Microbiology Procedures Handbook. Vol. 1. 2nd Edition. American Society for Microbiology Washington, D. C.
5.	Cerebrospinal fluid (CSF)	1. When meningitis is suspected.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
6.	Urogenital (Cervix swab, endometrial aspirate, genital ulcer, urethra swab & vagina swab)	1. Urogenital infections.		HO/ MO/ Specialist	• Isenberg, H.D. 2004. Aerobic Bacteriology. Clinical Microbiology Procedures Handbook. Vol. 1. 2nd Edition. American Society for Microbiology Washington, D. C.
7.	Ear swab	1. Middle ear infections. 2. External auditory canal infections.		HO/ MO/ Specialist	• Isenberg, H.D. 2004. Aerobic Bacteriology. Clinical Microbiology Procedures Handbook. Vol. 1. 2nd Edition. American Society for Microbiology Washington, D. C.
8.	Eye	1. Eye infections.		HO/ MO/ Specialist	• Isenberg, H.D. 2004. Aerobic Bacteriology. Clinical Microbiology

No.	Test	Indication	Description	Requester	Source/Rationale
		2. History of trauma or postoperative infection.			Procedures Handbook. Vol. 1. 2nd Edition. American Society for Microbiology Washington, D. C.
9.	Nasopharyngeal aspirate (NPA)	1. Relevant clinical history must be included in the request form.	• To detect carriers of Neisseria meningitidis, Corynebacterium diphtheriae and Streptococcus pyogenes.	HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
10.	Nasopharyngeal/ pernasal	1. Nasopharyngeal infections.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
11.	Sputum	1. Pulmonary infections.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
12.	Stool	1. Intestinal infections. 2. Travel, food suspected etiology.		HO/ MO/ Specialist	• Isenberg, H.D. 2004. Aerobic Bacteriology. Clinical Microbiology Procedures Handbook. Vol. 1. 2nd Edition. American Society for Microbiology Washington, D. C.
13.	Throat culture	1. Diagnosis of streptococcal		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District

No.	Test	Indication	Description	Requester	Source/Rationale
		pharyngitis.			Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
14.	Tissue	1. Relevant clinical history must be included in the request form.		HO/ MO/ Specialist	• Isenberg, H.D. 2004. Aerobic Bacteriology. Clinical Microbiology Procedures Handbook. Vol. 1. 2nd Edition. American Society for Microbiology Washington, D. C.
15.	Tracheal aspirate	1. Pneumoniae.		HO/ MO/ Specialist	• Isenberg, H.D. 2004. Aerobic Bacteriology. Clinical Microbiology Procedures Handbook. Vol. 1. 2nd Edition. American Society for Microbiology Washington, D. C.
16.	Urine culture	1. Urinary tract infections.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
17.	TB culture	1. TB infections.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
18.	Bordetella pertussis culture	1. Suspected of Bordetella pertussis		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District

No.	Test	Indication	Description	Requester	Source/Rationale
		infection.			Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
19.	CSF antigen detection	1. Relevant clinical history must be included in the request form.	• Diagnosis of H. influenzae type b, Neisseria meningitidis groups A, B, C, Y or W135, Streptococcus pneumoniae, Streptococcus group B and Escherichia coli K1 present in CSF.	HO/ MO/ Specialist	• Wellcogen Bacterial Antigen Kit Insert.
20.	CD culture	1. Clostridium difficile infection.		HO/ MO/ Specialist	• Chessbrough, M. 2001. Microbiological tests. District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press. United Kingdom.
21.	CD toxin detection	1. Clostridium difficile infection.		HO/ MO/ Specialist	• C. diff Quik Chek Complete Insert Kit.
22.	Mycoplasma/ ureaplasma identification	1. Relevant clinical history must be included in the request form.		HO/ MO/ Specialist	• Mycoplasma DUO Insert Kit
23.	Rotavirus antigen detection	1. Rotavirus gastroenteritis.		HO/ MO/ Specialist	• Rotavirus Insert Kit

No.	Test	Indication	Description	Requester	Source/Rationale
24.	Streptococcus pneumoniae antigen detection.	1. Pneumococcal infections.		HO/ MO/ Specialist	• Binax Strep pneumo Insert Kit

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: IMMUNOLOGY

GENERAL RULE:

1. All test requests must include relevant clinical history and diagnosis.
2. Please ensure that the test request is appropriate with the working diagnosis.

No.	Test	Indication	Description	Requester	Source/Rationale
	Routine Test				
1.	Anti-nuclear antibody (ANA)	1. Screening test for connective tissue diseases. 2. Screening test for other autoimmune disease i.e autoimmune hepatitis.	● Positive result does not confirm the diagnosis of a patient because ANA has low specificity. Other clinical and laboratory criteria/parameters are required for definitive diagnosis for any patient. ● Negative result does not ruled out underlying autoimmune disease because of low sensitivity of ANA in certain autoimmune diseases. In this case, doing ENA panel is perhaps more beneficial. ● Samples that are positive at low titer may be repeated after 3 months if there is strong clinical	MO/ Specialist	• Guidelines for the Laboratory Use of Autoantibody Tests in the Diagnosis and Monitoring of Autoimmune Rheumatic Diseases. Am J Clin Pathol; 2002; 117: 316-324. • International recommendations for the assessment of autoantibodies to cellular antigens referred to as anti-nuclear antibodies. Ann Rheum Dis; 2013; 1-7. • Evidence-based guidelines for the use of immunologic tests: Anti-nuclear antibody testing. Arthritis & Rheumatism. 2002; 47; 434-444.

No.	Test	Indication	Description	Requester	Source/Rationale
			suspicious of underlying autoimmune diseases. Patient with underlying autoimmune diseases usually will have persistent ANA positivity. ● For the patients that already have specific diagnosis, there is no clear indication to repeat ANA as ANA may persist to be positive regardless of the underlying disease activity and treatment received. Repeat of ANA test is allowed if there is any changes in disease entity. ● For negative ANA, it is recommended not to repeat ANA test unless there is a new clinical feature that is strongly associated with underlying autoimmune diseases.		
2.	Anti-double stranded DNA (dsDNA)	1. To help diagnosis of SLE. Anti-dsDNA is highly specific marker for SLE. 2. In patient who is already diagnosed with SLE, anti-dsDNA is a useful marker for disease monitoring.	● Positive result is useful to help diagnosis of SLE. ● Negative result does not rule out SLE as some patients may have negative anti-dsDNA at time of diagnosis but may have positive result during follow-up.	MO/ Specialist	• Guidelines for the Laboratory Use of Autoantibody Tests in the Diagnosis and Monitoring of Autoimmune Rheumatic Diseases. Am J Clin Pathol; 2002; 117: 316-324. • International recommendations for the assessment of

No.	Test	Indication	Description	Requester	Source/Rationale
			• Anti-dsDNA is a routine test during follow-up for patient with underlying SLE. • Anti-dsDNA role in other connective tissue diseases is not established and perhaps not useful. Thus, in other conditions, anti-dsDNA is not indicated. • A negative result after the initial screening for those not diagnose with SLE, it is not recommended to repeat anti-dsDNA.		autoantibodies to cellular antigens referred to as anti-nuclear antibodies. Ann Rheum Dis; 2013; 1-7 • Evidence-based guidelines for the use of immunologic tests: Anti-nuclear antibody testing. Arthritis & Rheumatism. 2002; 47;434-444.
3.	Extractable nuclear antigen antibody (ENA)	1. For determination of specific antibody for patients that have positive ANA. 2. For determination of specific antibody for patients with negative ANA but strong clinical suspicious of underlying autoimmune diseases that can be diagnosed with autoantibody available in this antibody panel.	• The test will provide qualitative result only. Thus, it is not recommended to repeat after the initial test reported unless there is new clinical indication for the new disease. • Seronegative may occur in patient with underlying autoimmune disease. Thus, other clinical, imaging and laboratory results should be reviewed for the final diagnosis of any patient.	MO/ Specialist	• Guidelines for the Laboratory Use of Autoantibody Tests in the Diagnosis and Monitoring of Autoimmune Rheumatic Diseases. Am J Clin Pathol; 2002; 117: 316-324. • International recommendations for the assessment of autoantibodies to cellular antigens referred to as anti-nuclear antibodies. Ann Rheum Dis; 2013; 1-7. • Evidence-based guidelines for

No.	Test	Indication	Description	Requester	Source/Rationale
					the use of immunologic tests: Anti-nuclear antibody testing. Arthritis & Rheumatism. 2002; 47;434-444.
4.	Anti-smooth muscle antibodies (ASMA)	1. To support diagnosis of autoimmune hepatobiliary diseases in patients with raised liver enzymes or those with clinical features suggestive of chronic liver disease/ cirrhosis.	• Positive ASMA and AMA if titration is 1:40 and above. • Positive ASMA occurs in the following condition; autoimmune hepatitis type 1, primary biliary cirrhosis (PBC), primary sclerosing cholangitis, overlap syndrome and viral hepatitis B/C infections. • Positive AMA is mainly specific for the diagnosis of primary biliary cirrhosis (PBC). • Some patients with underlying autoimmune hepatobiliary diseases are seronegative. Serologically negative PBC patient follow the similar clinical and histological features with seropositive patient.	MO/ Specialist	• Autoantibodies and liver disease: uses and abuses. Can J Gasteroenterol. 2010; 24 (4); 225-231.
5.	Anti-mitochondrial antibodies (AMA)				
6.	Syphilis serology test	1. Indication for screening: • Patient that has previous/current risk of getting syphilis.	• RPR is a non-treponemal antibody test. Thus, it is non-specific. Positive/reactive RPR needs to be confirmed with	MO/ Specialist	• 2015 Sexually Transmitted Diseases Treatment Guidelines https://www.cdc.gov/std/tg2015/syphilis.html

No.	Test	Indication	Description	Requester	Source/Rationale
		• Patient with HIV • Antenatal population • Baby born to mother diagnosed with syphilis during pregnancy. • Patient with clinical features suggestive of syphilis of any stage. • Population screening; before certain surgical/medical procedures, further study in certain institution and other relevant indications. 2. Indication for confirmatory test: • Positive screening test. • Negative screening test but suspected to have syphilis in the past based on a very suggestive clinical history.	treponemal antibody test i.e. syphilis IgG or TPPA. • Positive RPR but negative treponemal antibody test is a false positive result. • Positive RPR with positive treponemal antibody test represents serological evidence of syphilis infection. Stage of syphilis needs to be determined based on the clinical presentation in the patient. • Negative RPR but positive treponemal antibody test most likely to occur in past infection, latent or tertiary syphilis. • RPR is used for monitoring of syphilis following diagnosis and treatment. RPR titration correlates with disease activity. • Treponemal antibody test, once positive will be positive for life thus not suitable for disease monitoring. No indication to repeat this test once positive.		• The laboratory diagnosis of syphilis. Can J Infect Dis Med Microbiology. 2005; 45-51. • Diagnostic tests for syphilis; new tests and new algorithms. Neurol Clin Pract. 2014; 4(2); 114-122.doi10.1212/01.CPJ. 0000435752.17621.48

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: MYCOLOGY

GENERAL RULE:

1. Please adhere to specific sampling requirements before requesting for **antigen** detection tests
2. Antifungal susceptibility testing is not offered as a routine or standalone test (see details below)
3. Every test request must include a relevant clinical history, a working diagnosis and the name of the antifungal agent administered (if any)
4. The type of specimen submitted must be identified in detail (e.g. a blood sample from an indwelling central venous catheter must be labelled as such rather than just "blood" and a urine specimen obtained from a urinary catheter should also be labelled as such rather than just "urine")

No.	Test	Indication	Description	Requester	Source/Rationale
	Routine Test				
1.	*Aspergillus* antigen detection	1. Invasive aspergillosis	● Target group: neutropaenic patients post-chemotherapy, organ transplant recipients and other patients with immunosuppression. ● May be *falsely negative* in immuno-**competent** patients. ● May be *falsely positive* in patients treated with certain β-lactam antibiotics (piperacillin-tazobactam, amoxycillin-clavulanate, etc). ● Cross-reaction with certain other genera of fungi (e.g. *Penicillium, Paecilomyces* and *Histoplasma*) may	MO/ Specialist	• Platelia™ Aspergillus EIA kit insert • Consensus opinion of the relevant expert working group

No.	Test	Indication	Description	Requester	Source/Rationale
			also produce *false positive* results. ● A positive test result should **always** be interpreted **in conjunction** with other diagnostic procedures (e.g. CT evidence, fungal cultures and histopathological examination). ● Specimens accepted: blood and BAL fluid.		
2.	*Candida* antigen detection	1. Invasive candidiasis	● Test has not been evaluated with **neonatal** or **paediatric** sera. ● A negative test by itself does not rule out invasive candidiasis because of the low concentration and rapid elimination of mannan antigen during infection. ● *Falsely positive* results may be observed with sera containing high concentrations of gamma-globulins and/or samples that are also reactive for anti-toxoplasma antibodies ● Specimens accepted: **BLOOD** only	MO/ Specialist	• Platelia™ Candida Ag Plus kit insert • Consensus opinion of the relevant expert working group
3.	*Cryptococcus* antigen detection	1. Cryptococcal meningitis or crypto-coccaemia caused by either *C. neoformans* or *C.*	● Possible *false positive* results due to cross-reaction with *Trichosporon.* ● For meningitis, serial antigen titers are	MO/ Specialist	• IMMY CrAg LFA kit insert • Consensus opinion of the relevant expert working

No.	Test	Indication	Description	Requester	Source/Rationale
		gattii.	**not** helpful in case management ● Thus, for meningitis cases, a minimum waiting period of THREE months from the last positive titration result is required before a repeat request for titration will be entertained. ● Specimens accepted: blood and CSF (BAL and urine are **not** acceptable)		group
4.	Fungal culture	1. Mycoses caused by yeasts, moulds and thermally dimorphic fungi.	● Culture plates will be incubated for up to 28 days, provided no bacterial contamination occurs. ● Antifungal susceptibility testing is not performed routinely but may be considered for selected fungal isolates and only after consulting the clinical microbiologist on duty.	MO/ Specialist	• Consensus opinion of the relevant expert working group
5.	Blood culture & sensitivity	1. Systemic mycoses caused by yeasts, certain moulds and thermally dimorphic fungi.	● BACTEC bottles will be incubated for up to 28 days, provided no bacterial contamination occurs. ● Antifungal susceptibility testing is performed on *Candida* spp. isolated from positive cultures. It is not performed routinely on moulds or non-*Candida* yeasts due to the lack of	MO/ Specialist	• Consensus opinion of the relevant expert working group • CLSI M27-S4 document

No.	Test	Indication	Description	Requester	Source/Rationale
			established guidelines to interpret antifungal susceptibility testing results (MIC) for these fungi.		
6.	*Pneumocystis jirovecii* detection	1. **P**neumo**c**ystis **p**neumonia (PCP)	● NB: a negative result does not rule out PCP ● Specimens accepted: BAL (preferred), tracheal aspirate and induced sputum.	MO/ Specialist	• Consensus opinion of the relevant expert working group
7.	Potassium hydroxide examination	1. Cutaneous mycoses (including oculomycoses-keratitis)	● This test is **neither** highly **sensitive** nor **specific** and should not be relied upon solely to rule out the presence of a fungal infection.	MO/ Specialist	• Consensus opinion of the relevant expert working group

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: MOLECULAR BIOLOGY

GENERAL RULE:

1. Test requests as per indications and consensus / guidelines.
2. Requests will be screened prior to testing, those not fulfilling sample requirements and indications will be rejected.

No.	Test	Indication	Description	Requester	Source/Rationale
	Specialised Test				
1.	Hepatitis B Virus DNA Quantitative PCR-HBV(DNA)PCR	1. Monitoring of chronic hepatitis B patients, after diagnosis by serology. 2. Diagnosis of hepatitis B reactivation in immunosuppressed patients, with non-reactive or reactive anti-HBs.	• Not for screening. • Frequency or interval of testing depends on HBV viral load, liver function (ALT), HBeAg, cirrhosis etc.	MO / Specialist	Consensus opinion of the relevant expert working group, examples • Asian-Pacific clinical practice guidelines on the management of hepatitis B: a 2015 update. Hepatol. Int. (2016) 10:1–98. • DOI 10.1007/s12072-015-9675-4 • 2015 World Health Organization (WHO) guidelines for the prevention, care, and treatment of persons with chronic hepatitis B infection. http://apps.who.int/medicinedocs/documents/s21813en/s21813

No.	Test	Indication	Description	Requester	Source/Rationale
					en.pdf • EASL 2017 Clinical Practice Guidelines on the management of hepatitis B virus infection European Association for the Study of the Liver. Journal of Hepatology 2017; 67:370–398.
2.	Hepatitis C Virus RNA Quantitative PCR-HCV (RNA) PCR	1. Confirmation of active hepatitis C disease in anti-HCV seropositive patients. 2. Confirmation of indeterminate or borderline anti-HCV serology. 3. Monitoring of chronic hepatitis C patients according to consensus. 4. For confirmation of SVR (a qualitative HCV RNA is sufficient but the test is not offered)	• Not for screening. • Frequency or interval of testing depends on HCV viral load, liver function (ALT), cirrhosis, HCV genotype, treatment regimen, etc.	MO / Specialist	• Guidelines for the screening, care and treatment of persons with chronic hepatitis C infection WHO 2016. http://apps.who.int/iris/bitstream/10665/205035/1/9789241549615_eng.pdf?ua=1 • APASL consensus statements and recommendation for hepatitis C prevention, epidemiology, and laboratory testing. Hepatol Int 2016 10:681–701. • Hepatitis C guidance: AASLD-IDSA recommendations for testing, managing, and treating adults infected with hepatitis C virus. 2015.

No.	Test	Indication	Description	Requester	Source/Rationale
3.	Human Immunodeficiency Virus RNA Quantitative PCR-HIV (RNA) PCR	1. Confirmation of borderline or indeterminate serology. 2. Baseline HIV viral load at diagnosis. 3. Monitoring of HIV patients on HAART, according to consensus. 4. Diagnosis of HIV in newborns of HIV-positive mothers.	• Frequency or interval of testing depends on HIV viral load, CD4 count and other clinical parameters.	MO / Specialist	• Guidelines for the Management of Adult HIV Infection with Antiretroviral Therapy, MOH Malaysia 2011. • Consolidated guidelines on HIV prevention, diagnosis, treatment and care for key populations. WHO 2016. • Management of HIV infection in children. CPG, MOH Malaysia. 2008. http://www.moh.gov.my/penerbitan/CPG2017/3887.pdf • Diagnosis of HIV Infection in Infants and Children. https://aidsinfo.nih.gov/guidelines/html/3/perinatal/509/diagnosis-of-hiv-infection-in-infants-and-children • Guidelines for the Management of Adult HIV Infection with Antiretroviral Therapy. MOH Malaysia, 2017. http://www.moh.gov.my/images/gallery/Garispanduan/HIVGUIDELINES.pdf
4.	*Mycobacterium*	1. For detections of MTB/NTM in body	• Must be done together with	MO / Specialist	• Report of an Expert

No.	Test	Indication	Description	Requester	Source/Rationale
	tuberculosis & Non-tuberculous Mycobacterium Qualitative PCR – TB/NTM PCR	fluids and tissues.	AFB stain and conventional culture. • Test results should be correlated with symptoms and clinical presentations. • Does not distinguish between viable, disease-related organisms and nucleic acid persisting from prior infection. • Not indicated in patients already AFB positive or previously treated. • This test has not been studied for use with specimens from patients being treated with anti-tuberculous agents and, therefore should not be used to determine bacteriologic cure or to monitor response to therapy. It is not known how long the PCR assay can remain positive following treatment.		Consultation on the Uses of Nucleic Acid Amplification Tests for the Diagnosis of Tuberculosis. CDC US. Available at https://www.cdc.gov/tb/publications/guidelines/amplification_tests/default.htm
5.	Cytomegalovirus DNA Quantitative PCR -CMV(DNA) PCR	1. To monitor immunocompromised patients such as post-transplant, HIV patients for pre-emptive treatment and to determine response to treatment.	• Maximum once a week (viral half-life is 5 days). • Viral load cut-off not defined, depends on host factors,	MO / Specialist	• S.A. Ross, Z. Novak, S. Pati, and S.B. Boppana. Diagnosis of Cytomegalovirus Infections. Infect Disord Drug Targets. 2011; 11(5): 466–474.

No.	Test	Indication	Description	Requester	Source/Rationale
			transplant etc.		• Kotton CN, Kumar D, Caliendo AM, et al. Updated international consensus guidelines on the management of cytomegalovirus in solid-organ transplantation. *Transplantation.* 2013:96:333 360. • Razonable RR, Åsberg A, Rollag H, et al. Virologic suppression measured by a cytomegalovirus (CMV) DNA test calibrated to the WHO international standard is predictive of CMV disease resolution in transplant recipients. Clin Infect Dis. 2013;56:1546–1553.
6.	Epstein-Barr Virus Quantitative PCR-EBV PCR	1. For detection and quantitative measurement of EBV DNA. To monitor post-transplant lymphoproliferative disorders (PTLD). 2. As an adjunct in diagnosis, prognostication and post-treatment monitoring of nasopharyngeal carcinoma (NPC). 3. Diagnosis of central nervous system lymphoma in AIDS patients (CSF	• Quantitative evaluation of EBV DNA has been shown to correlate highly with the subsequent (3-4 months) development of PTLD in susceptible patients. • Serial determination of blood specimens is necessary to monitor increasing (risk of development PTLD) or	MO / Specialist	• Kanakry JA, Hegde AM, Durand CM, et al. The clinical significance of EBV DNA in the plasma and peripheral blood mononuclear cells of patients with or without EBV diseases. Blood 2016;127:2007 -2017. • Green M, Cacciarelli TV, Mazariegos GV, et al: Serial measurement of Epstein-Barr

No.	Test	Indication	Description	Requester	Source/Rationale
		sample)	decreasing (treatment efficacy) levels of EBV DNA. • Viremia or viral shedding may occasionally be detected in asymptomatic individuals. • This test should not be used to screen asymptomatic patients.		viral load in peripheral blood in lymphoproliferative disease. Transplantation 1998;66(12):1641-1644. • Chan KCA, Woo JKS, King A, et al. Analysis of plasma Epstein–Barr virus DNA to screen for nasopharyngeal cancer. N Engl J Med 2017;377:513-22. • Chan KCA. Plasma Epstein-Barr virus DNA as a biomarker for nasopharyngeal carcinoma. Chin J Cancer; 2014; 33(12):598-603. • M Bibas, A Antinori. EBV and HIV-Related Lymphoma. Mediterr J Hematol Infect Dis. 2009; 1(2): e2009032. • doi: 10.4084/MJHID.2009.032

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: VIROLOGY SEROLOGY

GENERAL RULE:

1. All test requests must include relevant clinical history and diagnosis.
2. Please ensure that the test request is appropriate with the working diagnosis.

No.	Test	Indication	Description	Requester	Source/Rationale
	Routine Test				
A.	**Hepatitis Screening**				
1.	Anti –Hbe	1. Only for confirmed case of chronic hepatitis B carrier to ascertain patient's infectivity status.	• Refer Panduan Perkhidmatan Makmal JPMD	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
2.	HBeAg				
3.	Anti -HBs	1. No repeat of test if has documented level of ≥ 10mIU/mL.	• Staff screening request must be through Unit Kawalan Infeksi or Poliklinik Warga • Immunization is suggested for groups at risk of acquiring infection who have not been vaccinated previously.	Unit Kawalan Infeksi OR HO/ MO/ Specialist	• CDC. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*, 2011; 60 (RR-7):1–48. (https://www.cdc.gov/mmwr/pdf/rr/rr6007.pdf)
4.	Anti -HCV	1. No further Anti-HCV serology test will be done after establishing the diagnosis of HCV infection.			• WHO Guidelines on Hepatitis B & C Testing Feb 2017

No.	Test	Indication	Description	Requester	Source/Rationale
5.	Anti HBc Total	1. Indicated for: • New haemodialysis patients with positive Anti- HBs. • Blood donor	• Refer Panduan Perkhidmatan Makmal JPMD	HO/ MO/ Specialist	(http://www.who.int/hepatitis/publications/guidelines-hepatitis-c-b-testing/en/)
6.	Anti HBc IgM	1. Please include relevant clinical history and diagnosis.			• Consensus opinion of the relevant expert working group.
7.	HBsAg				
8.	Anti HAV Total				
9.	Anti HAV IgM				
B.	**Infectious Disease Screening**				
10.	• HBsAg • Anti-HBs • Anti- HCV • HIV Antigen/ Antibody	**1. Haemodialysis Patients** • HBsAg and Anti-HCV shall be performed every 3 months. • For HD patients/ HDU staff screening of Anti-HBs will only be done 6 monthly. • Thalassemia/ BMT patients screening will be done yearly. • Anti-HIV shall be performed every 6 months. • Confirmed anti-HCV and HIV positive patients may not require repeated serologic tests.	• Refer Panduan Perkhidmatan Makmal JPMD	HO/ MO/ Specialist	• Haemodialysis Quality And Standards, Ministry of Health Malaysia (http://www.moh.gov.my/images/gallery/Garispanduan/Haemodialysis_Quality_Standards.pdf)

No.	Test	Indication	Description	Requester	Source/Rationale
	• HBsAg • Anti-HBs • Anti- HCV • HIV Antigen/ Antibody	**2. Healthcare Worker Screening** • No repeat of Anti-HBs test if has documented level of ≥10mIU/ml.	• Staff screening request must be through Unit Kawalan Infeksi or Poliklinik Warga. • Completely vaccinated HCW with anti-HBs ≥10 mIU/mL are considered hepatitis B immune.	Unit Kawalan Infeksi OR HO/ MO/ Specialist	• CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Post exposure Management (https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6210a1.htm)
		3. Needle Prick Injury • HCWs who are exposed to a percutaneous injury, or contact, of mucous membrane or non-intact skin with blood, tissue, or other body fluids that are potentially infectious.	• During office hours – Report must be through infection control unit. • Urgent test after office hours - Report to Emergency Department & contact Virology Specialist on-call (to run the test urgently).	Unit Kawalan Infeksi HO/ MO/ Specialist	• Flowchart for management of sharp injury/mucosal exposure. HCTM. PPUKM • Guidelines on Occupational Exposures, Ministry of Health Malaysia. (http://www.moh.gov.my/images/gallery/Garispanduan/pekerjaan/OE-HIV-HBV-HCV-PEP.pdf)
C.	**HIV Screening**				
11.	HIV Antigen/ Antibody	**1.** No further HIV serology test will be done after establishing the diagnosis of HIV infection.	• Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• The *Consolidated guidelines on HIV testing services, WHO.* (http://www.who.int/hiv/pub/guidelines/hiv-testing-services/en/)

No.	Test	Indication	Description	Requester	Source/Rationale
D.	**HIV Confirmation**				
12.	HIV Confirmatory (Immunoblot LIA)	1. By special request only; upon discussion with Microbiology specialist. 2.	• Refer Panduan Perkhidmatan Makmal JPMD.	Specialist only	• Consensus opinion of the relevant expert working group.
E.	**TORCH Panel**				
13.	TORCH IgM	1. Neonates/ children < 6 month old ; only TORCH IgM test will be done. 2. Please include relevant clinical history and diagnosis.	• Refer Panduan Perkhidmatan Makmal JPMD. • Syphilis test is not included.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
14.	TORCH IgG				
F.	**Other Viruses**				
15.	• Measles IgG • Mumps IgG • Rubella IgG • VZV IgG	1. Screening for staff is budget dependent, except for staff on posting at Paediatric/ NICU - upon discussion with the Head of Virology Unit.	• Screening request must be through Unit Kawalan Infeksi or Poliklinik Warga only.	Unit Kawalan Infeksi HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
16.	Dengue NS1 Antigen	1. For patients with history of fever < 5 days. 2. **Day of fever** MUST be included for interpretation of results.	• Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
17.	Dengue IgG & IgM	1. For suspected dengue infection with history of fever and relevant blood test results suggestive of dengue. 2. **Day of fever** MUST be included for interpretation of results.	• Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.

No.	Test	Indication	Description	Requester	Source/Rationale
		3. No repeat of test to be done: • when results was already positive; • within 48 hours of previous request.			
18.	Measles IgM	1. Please include relevant clinical history and diagnosis.	• Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
19.	Mumps IgM				
20.	EBV IgG				
21.	EBV IgM				
22.	HSV 1 & 2 IgG				
23.	HSV 1 & 2 IgM				
24.	Rubella IgM	1. Please include relevant clinical history and diagnosis.	• Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
25.	VZV IgM				
26.	Parvovirus IgG				
27.	Parvovirus IgM				
G.	**Atypical Pneumoniae**				
28.	Chlamydophila pneumoniae IgG	1. Please include relevant clinical history and diagnosis.	• Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
29.	Chlamydophila pneumoniae IgM				
30.	Legionella pneumophila IgG				

No.	Test	Indication	Description	Requester	Source/Rationale
31.	Legionella pneumophila IgM				
32.	Mycoplasma pneumoniae IgM				
33.	Mycoplasma pneumoniae Total Ab		• Detect both IgG & IgM		
H.	**Other Microbes**				
34.	Chlamydia trachomatis IgG	1. Please include relevant clinical history and diagnosis.	• Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
35.	Chlamydia trachomatis IgM				
36.	Leptospira IgG				
37.	Leptospira IgM				
38.	Toxoplasma IgG	1. Please include relevant clinical history and diagnosis	• Toxoplasma IgG Avidity test is not offered. • Refer Panduan Perkhidmatan Makmal JPMD.	HO/ MO/ Specialist	• Consensus opinion of the relevant expert working group.
39.	Toxoplasma IgM				

TEST REQUEST PROCEDURE IN JPMD, PPUKM

UNIT: TISSUE CULTURE

GENERAL RULE:

1. Collect specimens as soon after onset of symptoms as possible. The chance of viral recovery is best during the first 3 days after onset and is greatly reduced with many viruses beyond 5 days. Collect autopsy samples as soon after death as possible.
2. In general, place swabs, scrapings and small pieces of tissue into a tube containing a small volume of viral transport medium (VTM). Place fluid and bulk specimens (e.g., tissue, faeces) into sterile leak-proof containers.
3. Deliver all specimens to the laboratory as soon after collection as possible, since a loss of infectivity (to cell culture medium) will occur over time. Sample containing viruses at low titres are most likely show loss of infectivity with delayed transport.
4. If immediate delivery is not possible, REFRIGERATE specimens (2-8 ˚C) or place in wet ice or cold packs. DO NOT FREEZE SAMPLES.

No.	Test	Indication	Description	Requester	Source/Rationale
Specialized Test					
1.	Herpes simplex virus (Culture & IF)	1. **Indication**: • Genital/ oral ulcer • Ulcerative lesions • Keratoconjunctivitis • Encephalitis/ meningoencephalitis • Acute dermatological syndrome	• **Sample**: vesicle/ genital/ lesion/ cervical swab, conjunctival swab/ scraping, skin scraping/ biopsy, CSF, tissue, brain/ brain biopsy/ autopsy, urine • **Transportation**: viral transport medium/ sterile container in ice.	MO/ Specialist	• **Isenberg** (ed.), Clinical Microbiology Procedures Handbook. American Society for Microbiology, Washington, DC. • Panduan Perkhidmatan Makmal JPMD
2.	Enterovirus (Culture & IF)	1. **Indication**: • Respiratory infections • Hand, foot and mouth disease • Meningoencephalitis • Myocarditis • Acute neurological	• **Sample**: throat/ nasal swab, lesions swab/ conjunctival swab/ scrapping, CSF, tissue, brain/ brain biopsy/ autopsy, urine, faeces/ rectal swab. • **Transportation**: - Tissue/ biopsy in sterile container (in ice). - CSF in sterile container.	MO/ Specialist	• **Isenberg** (ed.), Clinical Microbiology Procedures Handbook. American Society for Microbiology, Washington, DC. • Panduan Perkhidmatan Makmal JPMD

No.	Test	Indication	Description	Requester	Source/Rationale
		syndrome	- Swab in VTM (in ice).		
3.	Respiratory viruses (Direct IF) **Tests for**: Influenza A&B, parainfluenza 1/2/3, adenovirus, respiratory syncytial virus, human metapneumovirus	1. **Indication**: • Influenza-like illness (ILI) • acute respiratory syndrome • Respiratory infections • Conjunctivitis	• **Sample**: throat/ nasal swab, lesions swab/ conjunctival swab/ scraping, CSF, tissue, brain/ brain biopsy/ autopsy, urine, faeces/ rectal swab. • **Transportation**: - Tissue / biopsy in sterile container (in ice). - CSF in sterile container. - Swab in VTM (in ice).	MO/ Specialist	• **Isenberg** (ed.), Clinical Microbiology Procedures Handbook. American Society for Microbiology, Washington, DC. • Panduan Perkhidmatan Makmal JPMD
4.	Respiratory viruses (Culture & IF) **Tests for**: Influenza A&B, parainfluenza 1/2/3, adenovirus, respiratory syncytial virus	1. **Indication**: • Influenza-like illness (ILI) • acute respiratory syndrome • Respiratory infections • Conjunctivitis	• **Sample**: throat/ nasal swab, lesions swab/ conjunctival swab/ scraping, CSF, tissue, brain/ brain biopsy/ autopsy, urine, faeces/ rectal swab. • **Transportation**: - Tissue / biopsy in sterile container (in ice). - CSF in sterile container. - Swab in VTM (in ice).	MO/ Specialist	• **Isenberg** (ed.), Clinical Microbiology Procedures Handbook. American Society for Microbiology, Washington, DC. • Panduan Perkhidmatan Makmal JPMD
5.	Cytomegalovirus (DEAFF, Culture & IF)	1. **Indication**: • Suspected CMV infection • Congenital infection	• **Sample**: blood (in EDTA), urine, throat/ nasal swab, CSF, tissue, brain/ brain biopsy / autopsy, urine, faeces/ rectal swab. • **Transportation**: - Blood in EDTA tube - Tissue/ biopsy in sterile container (in ice). - CSF in sterile container.	MO/ Specialist	• **Isenberg** (ed.), Clinical Microbiology Procedures Handbook. American Society for Microbiology, Washington, DC. • Panduan Perkhidmatan Makmal JPMD

No.	Test	Indication	Description	Requester	Source/Rationale
			- Swab in VTM (in ice).		
6.	Chlamydia trachomatis (IF)	1. **Indication**: • Conjunctivitis • Pneumonia in neonates or infants • Vaginal discharge • Sexually transmitted infections	• **Sample:** - cervical/ genital/ conjunctival smear on glass slide, - nasopharyngeal aspirate, respiratory discharge in sterile container	MO/ Specialist	• **Isenberg** (ed.), Clinical Microbiology Procedures Handbook. American Society for Microbiology, Washington, DC. • Panduan Perkhidmatan Makmal JPMD