



KEMENTERIAN KESIHATAN MALAYSIA
PERKHIDMATAN PATOLOGI

HOSPITAL

UNTUK KEGUNAAN MAKMAL

LAB No.

1. Nama :		2. No. Pendaftaran:	
3. No. K/P.:		4. Jantina: <input type="checkbox"/> Lelaki <input type="checkbox"/> Perempuan	
5. Umur:	6. Keturunan:	7. Wad/Klinik:	
8. Tarikh Masuk Wad:	9. Pekerjaan:	10. Taraf Perkahwinan:	11. <input type="checkbox"/> Bayar <input type="checkbox"/> Percuma

12. No. Laporan Dahulu:	13. Butiran Penting: <table border="0"> <tr> <td></td> <td>Ya</td> <td>Tidak</td> </tr> <tr> <td>Jaundice</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Lymphadenopathy</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Hepatomegaly</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Splenomegaly</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Bleeding Tendency</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>H/O Transfusion</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Haematinics</td> <td></td> <td></td> </tr> <tr> <td>.....</td> <td></td> <td></td> </tr> <tr> <td>.....</td> <td></td> <td></td> </tr> <tr> <td>Drug/Chemical History</td> <td></td> <td></td> </tr> <tr> <td>.....</td> <td></td> <td></td> </tr> <tr> <td>.....</td> <td></td> <td></td> </tr> <tr> <td>Data Makmal Terdahulu</td> <td></td> <td></td> </tr> <tr> <td>Hb</td> <td></td> <td></td> </tr> <tr> <td>Platelet</td> <td></td> <td></td> </tr> <tr> <td>TWDC</td> <td></td> <td></td> </tr> </table>		Ya	Tidak	Jaundice	<input type="checkbox"/>	<input type="checkbox"/>	Lymphadenopathy	<input type="checkbox"/>	<input type="checkbox"/>	Hepatomegaly	<input type="checkbox"/>	<input type="checkbox"/>	Splenomegaly	<input type="checkbox"/>	<input type="checkbox"/>	Bleeding Tendency	<input type="checkbox"/>	<input type="checkbox"/>	H/O Transfusion	<input type="checkbox"/>	<input type="checkbox"/>	Haematinics			Drug/Chemical History					Data Makmal Terdahulu			Hb			Platelet			TWDC		
		Ya	Tidak																																																	
Jaundice	<input type="checkbox"/>	<input type="checkbox"/>																																																		
Lymphadenopathy	<input type="checkbox"/>	<input type="checkbox"/>																																																		
Hepatomegaly	<input type="checkbox"/>	<input type="checkbox"/>																																																		
Splenomegaly	<input type="checkbox"/>	<input type="checkbox"/>																																																		
Bleeding Tendency	<input type="checkbox"/>	<input type="checkbox"/>																																																		
H/O Transfusion	<input type="checkbox"/>	<input type="checkbox"/>																																																		
Haematinics																																																				
.....																																																				
.....																																																				
Drug/Chemical History																																																				
.....																																																				
.....																																																				
Data Makmal Terdahulu																																																				
Hb																																																				
Platelet																																																				
TWDC																																																				
14. Ringkasan Klinikal, Penemuan Pembedahan dan Riwayat Keluarga:																																																				

15. Diagnosis:																																																																														
16. Kategori Permohonan/Jenis Ujian:																																																																														
<table border="1"> <tr><th>Patologi Kimia</th><th></th></tr> <tr><td>B. Sugar</td><td><input type="checkbox"/></td></tr> <tr><td>B. Urea</td><td><input type="checkbox"/></td></tr> <tr><td>S. Elec</td><td><input type="checkbox"/></td></tr> <tr><td>B. Gases</td><td><input type="checkbox"/></td></tr> <tr><td>S. Billirubin</td><td><input type="checkbox"/></td></tr> <tr><td>LFT</td><td><input type="checkbox"/></td></tr> <tr><td>Se. Creatinine</td><td><input type="checkbox"/></td></tr> </table>	Patologi Kimia		B. Sugar	<input type="checkbox"/>	B. Urea	<input type="checkbox"/>	S. Elec	<input type="checkbox"/>	B. Gases	<input type="checkbox"/>	S. Billirubin	<input type="checkbox"/>	LFT	<input type="checkbox"/>	Se. Creatinine	<input type="checkbox"/>	<table border="1"> <tr><th>Klinikal</th><th></th></tr> <tr><td>Bld. Count</td><td><input type="checkbox"/></td></tr> <tr><td>ESR</td><td><input type="checkbox"/></td></tr> <tr><td>BFMP</td><td><input type="checkbox"/></td></tr> <tr><td>U. Sugar</td><td><input type="checkbox"/></td></tr> <tr><td>U. Alb.</td><td><input type="checkbox"/></td></tr> <tr><td>U. ME</td><td><input type="checkbox"/></td></tr> <tr><td>Stool ME</td><td><input type="checkbox"/></td></tr> </table>	Klinikal		Bld. Count	<input type="checkbox"/>	ESR	<input type="checkbox"/>	BFMP	<input type="checkbox"/>	U. Sugar	<input type="checkbox"/>	U. Alb.	<input type="checkbox"/>	U. ME	<input type="checkbox"/>	Stool ME	<input type="checkbox"/>	<table border="1"> <tr><th>Hematologi</th><th></th></tr> <tr><td>FBP</td><td><input type="checkbox"/></td></tr> <tr><td>BM Asp</td><td><input type="checkbox"/></td></tr> <tr><td>Hb. Analysis</td><td><input type="checkbox"/></td></tr> <tr><td>Coagulation</td><td><input type="checkbox"/></td></tr> </table>	Hematologi		FBP	<input type="checkbox"/>	BM Asp	<input type="checkbox"/>	Hb. Analysis	<input type="checkbox"/>	Coagulation	<input type="checkbox"/>	<table border="1"> <tr><th>Histo/Saitologi</th><th></th></tr> <tr><td>Specimen</td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>	Histo/Saitologi		Specimen														<table border="1"> <tr><th>Mikro/Immunologi</th><th></th></tr> <tr><td>Specimen</td><td>Ujian</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>	Mikro/Immunologi		Specimen	Ujian												
Patologi Kimia																																																																														
B. Sugar	<input type="checkbox"/>																																																																													
B. Urea	<input type="checkbox"/>																																																																													
S. Elec	<input type="checkbox"/>																																																																													
B. Gases	<input type="checkbox"/>																																																																													
S. Billirubin	<input type="checkbox"/>																																																																													
LFT	<input type="checkbox"/>																																																																													
Se. Creatinine	<input type="checkbox"/>																																																																													
Klinikal																																																																														
Bld. Count	<input type="checkbox"/>																																																																													
ESR	<input type="checkbox"/>																																																																													
BFMP	<input type="checkbox"/>																																																																													
U. Sugar	<input type="checkbox"/>																																																																													
U. Alb.	<input type="checkbox"/>																																																																													
U. ME	<input type="checkbox"/>																																																																													
Stool ME	<input type="checkbox"/>																																																																													
Hematologi																																																																														
FBP	<input type="checkbox"/>																																																																													
BM Asp	<input type="checkbox"/>																																																																													
Hb. Analysis	<input type="checkbox"/>																																																																													
Coagulation	<input type="checkbox"/>																																																																													
Histo/Saitologi																																																																														
Specimen																																																																														
Mikro/Immunologi																																																																														
Specimen	Ujian																																																																													
Lain-lain																																																																														
.....																																																																														
.....																																																																														

17. Pengambilan Specimen:	Tarikh: <input type="text"/>	Masa: <input type="text"/>
18. Nama Doktor:		
19. Tarikh:		

Tandatangan dan Cop Doktor



HOSPITAL / KLINIK KESIHATAN
CLINICAL PHARMACOKINETICS SERVICE
Therapeutic Drug Monitoring (TDM) Request Form

Pharmacy Ref No:

- Note :**
- 3 – 5 ml of blood sample is needed for analysis of 1 – 3 drugs.
 - Use plain tubes for all the drugs except for Cyclosporin/Tacrolimus/Sirolimus/Everolimus (EDTA tube).
 - Correct information is crucial as interpretation of results is dependent on the information provided.

Date Received :
Time Received :

PATIENT PROFILE

Name :	Ward/Unit :	RN / IC :
Age :	Gender : M F	Race :
Weight (kg) :	Height (cm) :	DOA :

CLINICAL SUMMARY AND DIAGNOSIS

PATIENT CONDITION

INDICATION FOR REQUEST

- | | | | | |
|-----------------------------------|--|--------------------------------------|---|---|
| <input type="checkbox"/> Oedema | <input type="checkbox"/> Liver Disease | <input type="checkbox"/> Dehydration | <input type="checkbox"/> Therapeutic Monitoring | <input type="checkbox"/> Non-compliance |
| <input type="checkbox"/> Dialysis | <input type="checkbox"/> Burn | <input type="checkbox"/> Others | <input type="checkbox"/> Suspected Toxicity | <input type="checkbox"/> Others |

LATEST LAB RESULTS

CONCURRENT MEDICATIONS

Parameters	Date	Results (unit)	Parameters	Date	Results (unit)
Blood Urea			Temperature		
Na ⁺ / K ⁺			WBC		
Creatinine			ALT / AST / ALP		
Albumin			HR		
Culture & Sensitivity					

Monitoring Date

Drug Analysis (Tick ✓ where appropriate)	Present Dose Regimen	Dose Started		Monitoring Date				
		Date	Time	Predose / Post 1 / C ₀	Last Dose Given	Postdose / Post 6 / C ₂	Random	
				Time	Time	Time	Time	
Amikacin								
Benzodiazepine								
Carbamazepine								
Cyclosporin								
Digoxin								
Ethanol								
Everolimus								
Gentamicin								
Lithium								
Methotrexate								
Mycophenolic acid								
Paracetamol								
Phenobarbitone								
Phenytoin								
Salicylate								
Sirolimus								
Tacrolimus								
Theophylline								
Valproic acid								
Vancomycin								

REFER TO TDM SERUM SAMPLING GUIDELINES (refer back page)

For injectable drug being analysed :

Infusion rate :
 Duration of Infusion :

REQUESTED BY:

Doctor's Signature : _____ Name & Stamp : _____ Date : _____

Drug analysis	Result	Therapeutic Range	Calculated Pharmacokinetic Parameters			Time Finished :
			K _e :	C _{min new} :	Test done by :	
			t _{1/2} :	C _{max new} :		
			T :	CrCl :		
			C _{max} :	C _{pss} :		
			V _d :			

Pharmacist's Assessment & Recommendation :

FOR PHARMACY USE ONLY

Informed : DR / SNon atam/pm

Pharmacist's signature & stamp

TDM SERUM SAMPLING GUIDE							
DRUG		STEADY STATE (Time to monitor plasma concentrations)		SAMPLING TIME		THERAPEUTIC RANGE <i>(*The target reference ranges may vary based on institutional references & indication)</i>	SAMPLE STABILITY IN BLOOD
		SINGLE DAILY DOSING	MULTIPLE DOSING	SINGLE DAILY DOSING	MULTIPLE DOSING		
AMINOGLYCOSIDE	AMIKACIN	2 nd dose	3 rd or 4 th dose	1st sample Post 2 hours 2nd sample Post 6 hours (or any two post sampling at least 2 t _{1/2} apart)	Pre 0 – 30 min before dose Post 30 min after 30 min infusion completed	Trough: SDD: <1 mcg/ml Neonates: <5mcg/ml MDD & Dialysis : <10mcg/ml #Peak: Neonates, MDD: 20-30 mcg/ml SDD : *60 mcg/ml	8 hours
	GENTAMICIN					Trough: SDD, Neonates & synergistic: <1 mcg/ml MDD & Dialysis: <2mcg/ml #Peak: Neonates : 5-12 mcg/ml MDD : 5-10 mcg/ml SDD: *10-30 mcg/ml Synergy: 3-5 mcg/ml #adjustable according to indication	4 hours
			Impaired Renal Function: After 24 hours (after 1 st stat dose) or Pre-HD				
VANCOMYCIN		Normal Renal Function : 4 th dose Impaired Renal Function : After 24 hours (after 1 st stat dose) Continuous Infusion: Take a sample after 12 – 24 hours of starting the continuous infusion		Trough level: 30mins before dose Peak level: 1 hour after the infusion completed		Trough: Non-complicated infection : 10 – 15 mcg/ml Complicated infection : 15 – 20 mcg/ml Peak: 25 – 40 mcg/ml Continuous Infusion: 15 – 25 mcg/ml AUC₂₄/MIC: 400-600 mg.h/L	4 hours
CARBAMAZEPINE		Initiation : 2-3 weeks (Induction Phase) MD : 2-5 days after initiation and dose changes		Pre: 0 – 30mins before dose		4 – 12 mcg/ml	8 hours
PHENOBARBITAL		Without LD : 2-3 weeks After LD : 2-3 hours after administration		Pre: 0 – 30mins before dose		Epilepsy : 15 – 40 mcg/ml Refractory status epileptics : > 70mcg/ml (up to 100mcg/ml)	8 hours
PHENYTOIN		With LD : Oral: 24 hours IV : 2 hours (if rapid therapeutic concentration is needed) Without LD : 7 – 10 days		Pre: 0 – 30mins before dose		10-20 mcg/ml	8 hours
VALPROIC ACID		2- 4 days		Pre: 0 – 30mins before dose		Epilepsy : 50 – 100 mcg/ml Psychiatric Disorder : 50 – 125 mcg/ml	2 days
THEOPHYLLINE		Adults : 2days Children : 1 – 2 days Infants : 1 – 5 days Newborn : 120 hrs (5 days) Premature neonates : 150 hrs (6 days)		Pre: 0 – 30mins before dose		Apnoea/Bradycardia in neonates : 5 – 10 mcg/ml Asthma/COAD : 10 – 20 mcg/ml	8 hours
DIGOXIN		Without LD : 7 – 14 days With LD : 12 – 24 hours ESRD : 15 – 20 days		Pre: 0-30mins before dose Post: Oral : At least 6 hours after dose IV : At least 4 hours after dose		CHF : 0.5 – 0.9 ng/mL AF : 0.8 – 2 ng/mL	8 hours
CYCLOSPORINE (EDTA tube)		3-5 days		C⁰: Immediately before next dose C₂ : 2 hours after dose		According to drug indication General Therapeutic Range: C0-100-500mcg/L C2-600 - 1700mcg/L	7 days
TACROLIMUS (EDTA tube)		3 – 5 days		Pre: 0 – 30mins before dose		5 – 20 ng / ml	7 days
SIROLIMUS (EDTA tube)		Adults : 5 – 7days Children : 3 – 5 days		Pre: 0 – 30mins before dose		4 – 24 ng/ml	8 days
METHOTREXATE		24 - 48 hours		24hr or 48hr post infusion		Variable – Refer to specific protocols	2 days (Room temp)
SALICYLATE		Therapeutic : 5 – 7 days Toxicity : 4 hours after ingestion		Therapeutic: 1 – 3 hours after dose Toxicity : 4 hours after ingestion		Rheumatic Fever : 250 – 400 mcg/ml Anti-inflammatory : 150 – 300 mcg/ml	8 hours
PARACETAMOL		Toxicity : 4 hours after ingestion		Toxicity : 4 hours after single acute ingestion OR Unknown Ingestion Time : 2 sample at 2 hours interval		Refer Rummack Matthew Nomogram	8 hours
LITHIUM		4 – 5 days		Pre: 12 hours after dose (twice daily dosing) Pre: 24 hours after dose (once daily dosing)		0.5 – 1.5 mmol/L	24 hours

References:

i) Martindale 33th Ed. 2002. ii) Basic Clinical Pharmacokinetic (Winter) 2010. iii) Drug Information Handbook 10th Ed. 2003. iv) British National Formulary. Vol. 70 Sept 2015. v) Micromedex(R) Healthcare Series 2018. vi) Infectious Disease Society of America. vii) Drug Doses. Frank Shank. 17th Edition 2017. viii) https://journals.lww.com/drug-monitoring/Abstract/2000/08000/Stability_of_Sirolimus_Rapamycin_in_Whole_Blood.10.aspx. ix) https://journals.lww.com/drug-monitoring/Abstract/2003/02000/In_Vitro_Stability_Study_of_Methotrexate_in_Blood.12.aspx. x) Gidwani Lithium Stability Study 2018. xi) Clinical Therapeutic/Vol.22. SUPP.LB. 2000 Measurement of Sirolimus in Whole Blood Using High-Performance Liquid Chromatography with Ultraviolet Detection. D.W. Holt et. al., xj) Stability of Tacrolimus (FK 506) and Cyclosporin G in Whole Blood. T.M. Annesley. et. al., TDM 17:361-365 1995 Lippincott-Raven Publishers, Philadelphia.