



Pharmacy Information System (PhIS) and Clinic Pharmacy System (CPS)

Pharmacy Based User Manual Therapeutic Drug Monitoring (TDM)

Version	: 7th EDITION
Document ID	: PB_U. MANUAL_THERAPEUTIC DRUG MONITORING



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Reference ID : PB_U. MANUAL_THERAPEUTIC DRUG MONITORING-7th EDITION

Application reference: PhIS & CPS v1.7.1



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1.0 Introduction

1.1 Overview of PhIS

Pharmacy Information System or better known as PhIS, is a complete and comprehensive system that integrates pharmacy related services geared towards pharmacy excellence. PhIS implementation would transform most of current manual process to electronic system would benefit facility end user in the health care sector.

There are 12 modules to assist services delivery by the health care sector which comprises of:

1. Order Management
2. Inpatient Pharmacy
3. Outpatient Pharmacy
4. Medication Counselling
5. Ward Pharmacy
6. Pharmacy Inventory
7. Manufacturing of Cytotoxic Drug Reconstitution, Parenteral Nutrition, IV Admixture & Eye Drop , Radiopharmaceuticals and Extemporaneous
8. Adverse Drug Reaction & Drug Allergic (ADR & DAC)
9. Clinical Pharmacokinetics Services (TDM)
10. Drug Information & Consumer Education (DICE)
11. Medication Therapy Adherence Clinic (MTAC)
12. Data Mining (PhARM)

1.2 Purpose and Objectives

This user manual outlines the Therapeutic Drug Monitoring (TDM) module and its key features/functionalities. The primary objective is to help guide user through the process of completing PhIS application process. User will understand the following activities in detail:

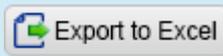
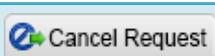
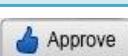
1.3 Organised Sections

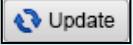
These are the sections within this document:

- Section 1 : Introduction
- Section 2 : Application Standard Features
- Section 3 : Therapeutic Drug Monitoring
- Section 4 : Acronyms
- Section 5 : Links To Clinical Modules

2.0 Application Standard Features

2.1 PhIS Legend

Standard Legend			
	Login to PhIS		Logout from PhIS
	Change Login Password		Reset Login Screen
	Expand Menu		Collapse Menu
	Display Home Tab		Expand Module
	Collapse Module		Close All Open Tabs
	Refresh Screen		Search Record
	Add/Create New Record		Show Help
	Print	*	Mandatory Field
	Calendar Icon		Search Icon
	Close Window		Radio Button
<input type="checkbox"/>	Checkbox		Edit Record
	Cancel		Delete Record
	Save		Export and Open Report in Excel Format
	Add Item to the list		Delete Item from the list
	Request for Approval		Cancel the Request
	Approve Transaction		Reject Transaction
	Automatically Display/Retrieve Box	<input type="text"/>	Empty Text Box
	Dropdown Box		

TDM Module Legend			
 Delete	Delete Record	 Update	Update Record
TDM Guidelines	Display TDM Guidelines Details	 Add	Add Sampling Details
 Update	Update Sampling Details	Drug Info	Display Selected TDM Drug Information
 New	Create New TDM Order	 Add New Sample	Add New Sampling Details
 Place TDM Order	Display TDM Order Screen to Place New TDM Order	Details	Display Reporting Details Screen
Register Patient	Register External Patient for Outsource	Manage Sample	Display External TDM Resulting Screen

Note

To learn more about Login Information, kindly click [Login Information](#) module for descriptive steps.



2.2 Latest Enhancement and Updates

Latest Functions	Page
Tdm Order <ul style="list-style-type: none">• New flow of ordering TDM Drug• Can do multiple TDM Drug in one time• Change Facility field(Outsource) from drop down menu to Auto complete search drops down	13 -28

3.0 Therapeutic Drug Monitoring (TDM)

Overview

The Order Management - Therapeutic Drug Monitoring (TDM) module handles all the information to specify the ordered items as per local drug formulary, MOH and non-MOH including registered and non-registered drugs. This function is to enable data mining. All medication orders must be prescribed by authorized personnel only and in compliance with guidelines on prescribing in the drug formulary (drug category, discipline / specialty) as defined by MOH.

User Group

This module is intended for Pharmacist, Assistant Pharmacist and Nurse.

Functional Diagram

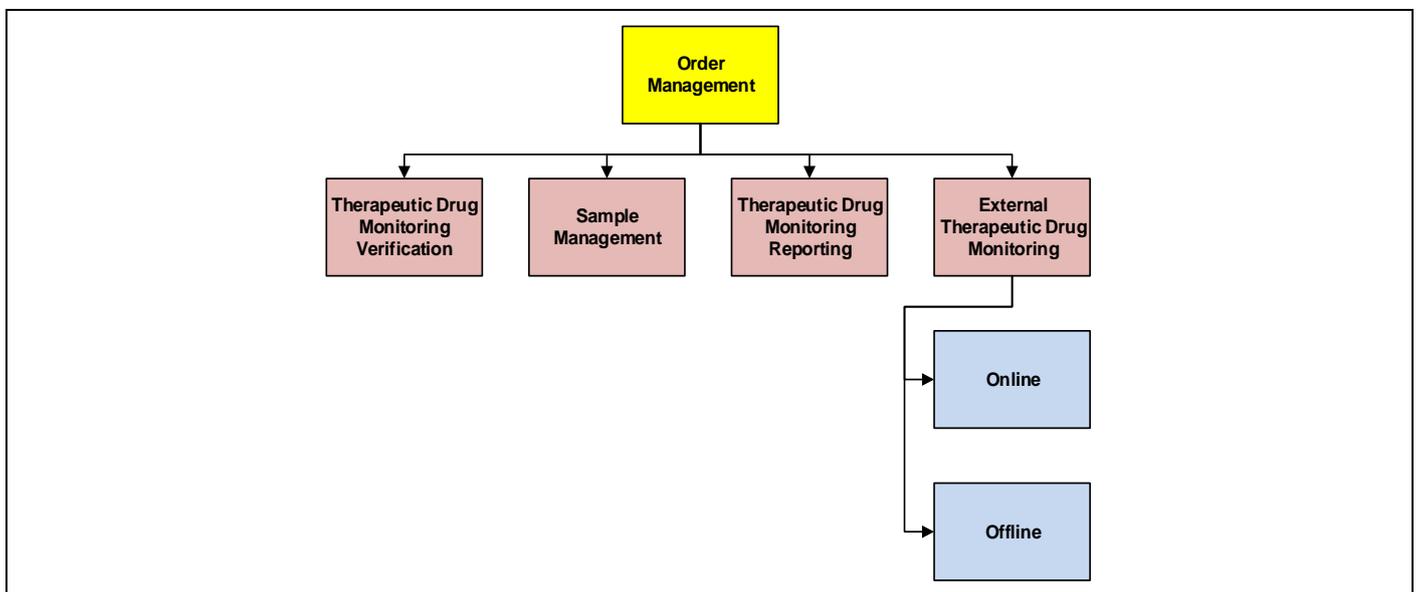


Figure 3.0-1

Functional Description

Therapeutic Drug Monitoring (TDM) comprises of four (4) main functions:

- **Verification**
Verification is for pharmacist to verify the prescriptions received from order management. This process is mandatory for all prescriptions receive before the user can proceed with reporting.
- **Sample Management**
TDM Sampling Management is to record the sampling details into the system including information of the samples which need to be send outsource.
- **Reporting**
TDM Reporting is to enter the TDM resulting and the interpretation to the Doctor.
- **External TDM**
External TDM is for record TDM resulting received from other facility

3.1 Search Registered Patient

To view existing patient record, perform steps below:

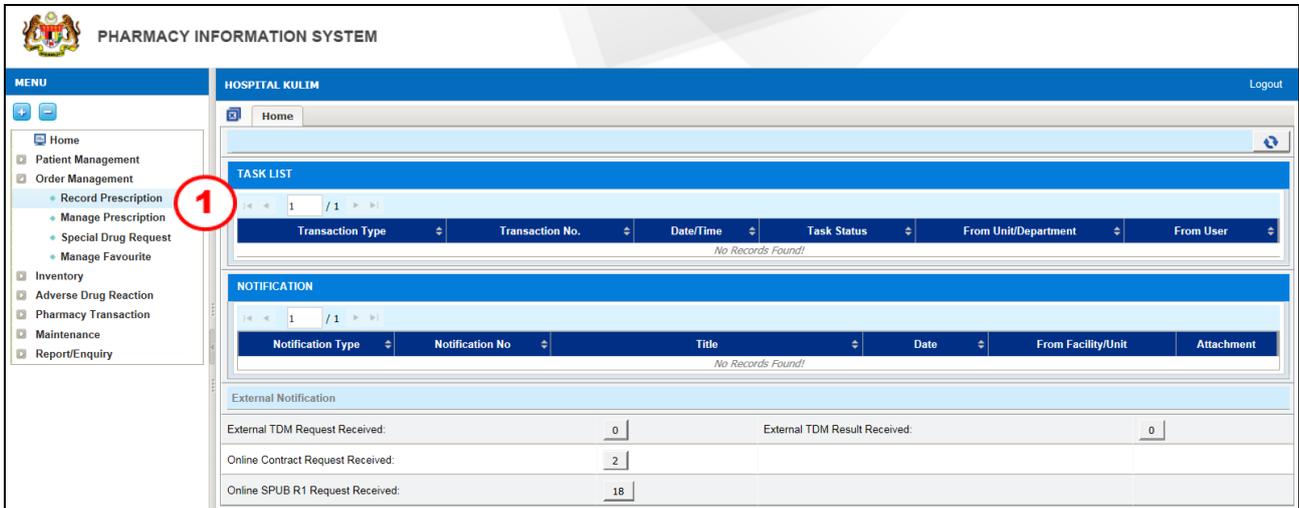


Figure 3.1-1 PhIS Home page

STEP 1

Click on 'Order Management' menu followed by 'Record Prescription' and screen will be displayed as per Figure 3.1-1

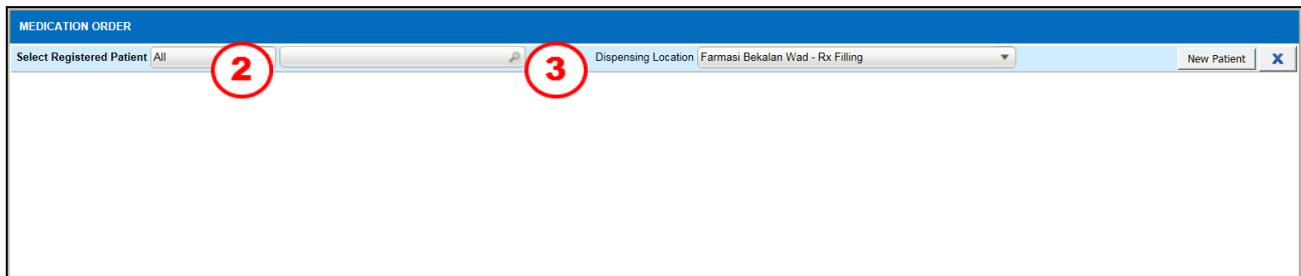


Figure 3.1-2 Medication Order

STEP 2

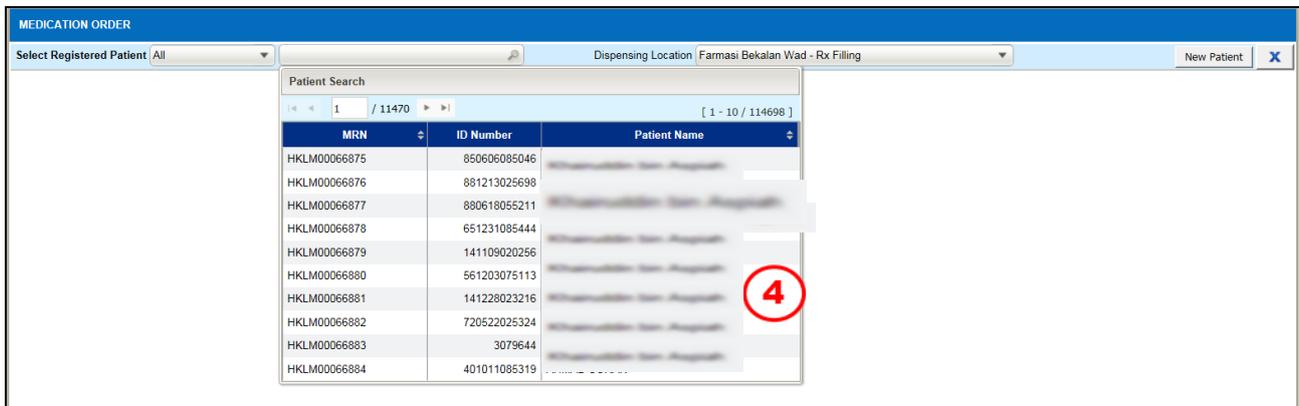
Enter registered patient name

STEP 3

Click on the  button to search for a registered patient

Note

- This page is used to search for a registered patient
- If the patient is not registered, click on the  button and the Patient Registration screen will be displayed.



MRN	ID Number	Patient Name
HKLM00066875	850606085046	[Redacted]
HKLM00066876	881213025698	[Redacted]
HKLM00066877	880618055211	[Redacted]
HKLM00066878	651231085444	[Redacted]
HKLM00066879	141109020256	[Redacted]
HKLM00066880	561203075113	[Redacted]
HKLM00066881	141228023216	[Redacted]
HKLM00066882	720522025324	[Redacted]
HKLM00066883	3079644	[Redacted]
HKLM00066884	401011085319	[Redacted]

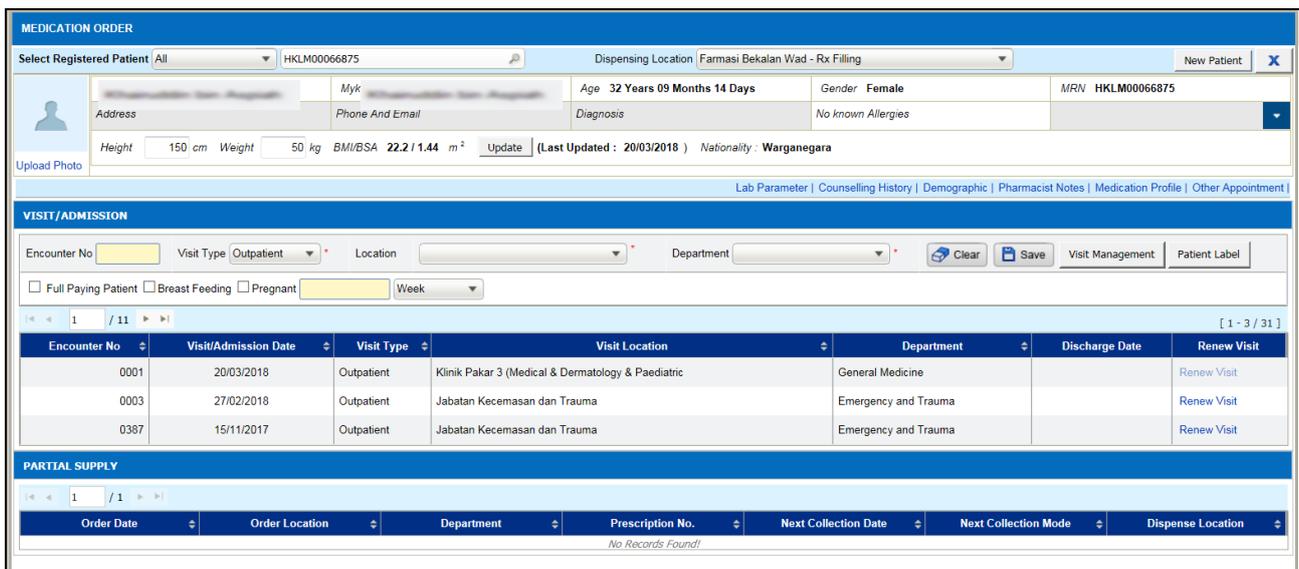
Figure 3.1-3 Search Patient

STEP 4

Double-click on the selected patient and the details will be displayed as per Figure 3.1-4

Note

- Click on the 'Renew Visit' hyperlink to renew a visit for the same location.
- Select the 'Visit Type' and 'Location' to create a new visit.
- Click on the [Visit Management](#) button to assess 'Visit Management' Screen. (Refer to Appendix 1).



PATIENT DETAILS

MRN: HKLM00066875
 Age: 32 Years 09 Months 14 Days
 Gender: Female
 Diagnosis: No known Allergies
 Height: 150 cm, Weight: 50 kg, BMI/BSA: 22.2 / 1.44 m²
 Nationality: Warganegara

VISIT/ADMISSION HISTORY

Encounter No	Visit/Admission Date	Visit Type	Visit Location	Department	Discharge Date	Renew Visit
0001	20/03/2018	Outpatient	Klinik Pakar 3 (Medical & Dermatology & Paediatric)	General Medicine		Renew Visit
0003	27/02/2018	Outpatient	Jabatan Kecemasan dan Trauma	Emergency and Trauma		Renew Visit
0387	15/11/2017	Outpatient	Jabatan Kecemasan dan Trauma	Emergency and Trauma		Renew Visit

Figure 3.1-4 Medication Order Screen

MEDICATION ORDER

Select Registered Patient: All | HKLM00066875 | Dispensing Location: Farmasi Bekalan Wad - Rx Filing | New Patient: X

Myk: [REDACTED]	Age: 32 Years 09 Months 14 Days	Gender: Female	MRN: HKLM00066875
Phone: [REDACTED]	Diagnosis: [REDACTED]	No known Allergies	

Height: 150 cm | Weight: 50 kg | BMI/BSA: 22.2 / 1.44 m² | Update: (Last Updated: 20/03/2018) | Nationality: Warganegara

Lab Parameter | Counselling History | Demographic | Pharmacist Notes | Medication Profile | Other Appointment

VISIT/ADMISSION

Encounter No: [REDACTED] | Visit Type: Outpatient | Location: [REDACTED] | Department: [REDACTED] | Clear | Save | Visit Management | Patient Label

Full Paying Patient | Breast Feeding | Pregnant | [REDACTED] | Week: [REDACTED]

[1 - 3 / 31]

Encounter No	Visit/Admission Date	Visit Type	Visit Location	Department	Discharge Date	Renew Visit
0001	20/03/2018	Outpatient 5	Klinik Pakar 3 (Medical & Dermatology & Paediatric)	General Medicine		Renew Visit
0003	27/02/2018	Outpatient	Jabatan Kecemasan dan Trauma	Emergency and Trauma		Renew Visit
0387	15/11/2017	Outpatient	Jabatan Kecemasan dan Trauma	Emergency and Trauma		Renew Visit

PARTIAL SUPPLY

[1 - 3 / 31]

Order Date	Order Location	Department	Prescription No.	Next Collection Date	Next Collection Mode	Dispense Location
No Records Found!						

Figure 3.1-5 Visit/Admission Detail

STEP 5

Double-click on the selected visit as per Figure 3.1-5

3.2 New Patient Registration

This page is used to register new patient

To register new patient in to the system, perform the steps below:

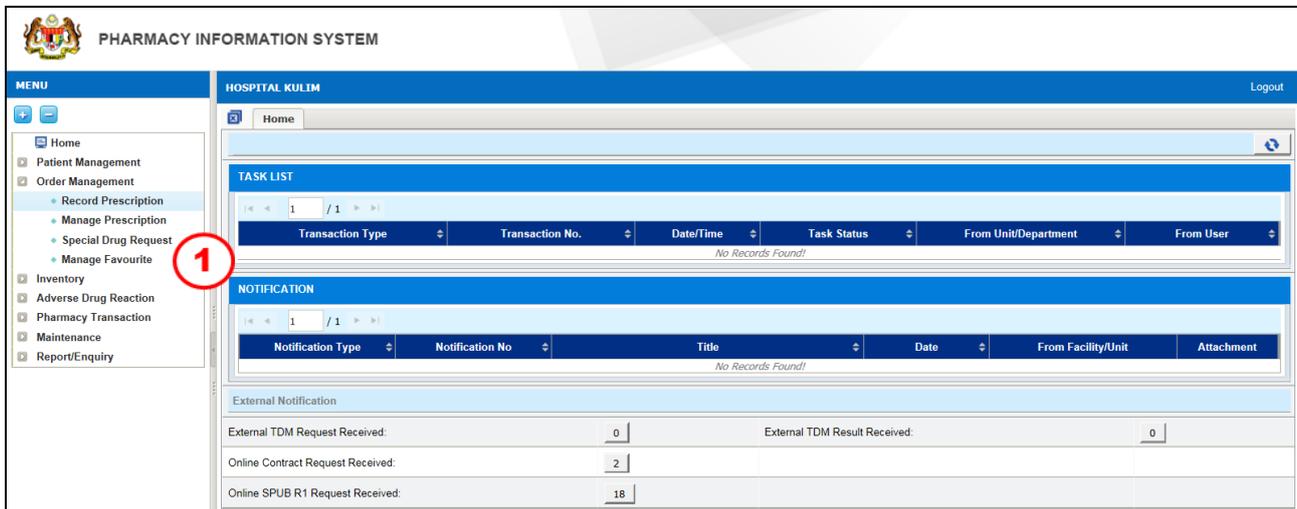


Figure 3.2-1 PhIS Home Page

STEP 1

Click on 'Order Management' menu followed by 'Record Prescription' and screen will be displayed as per Figure 3.2-1

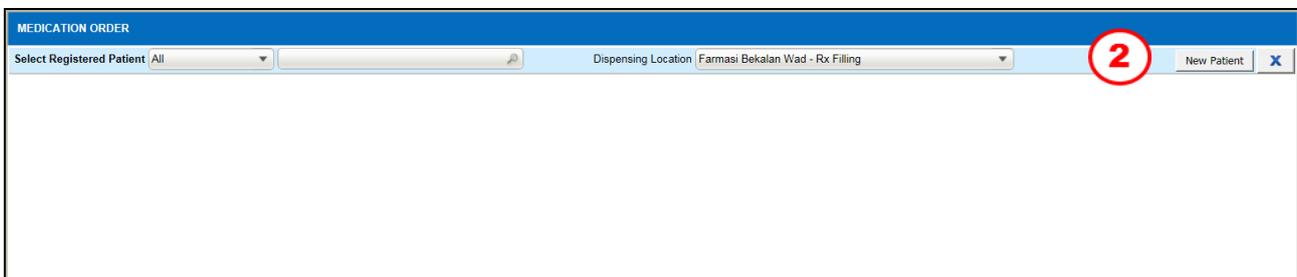


Figure 3.2-2 Transcribe Order Create New Patient

STEP 2

Click on the to register for new patient

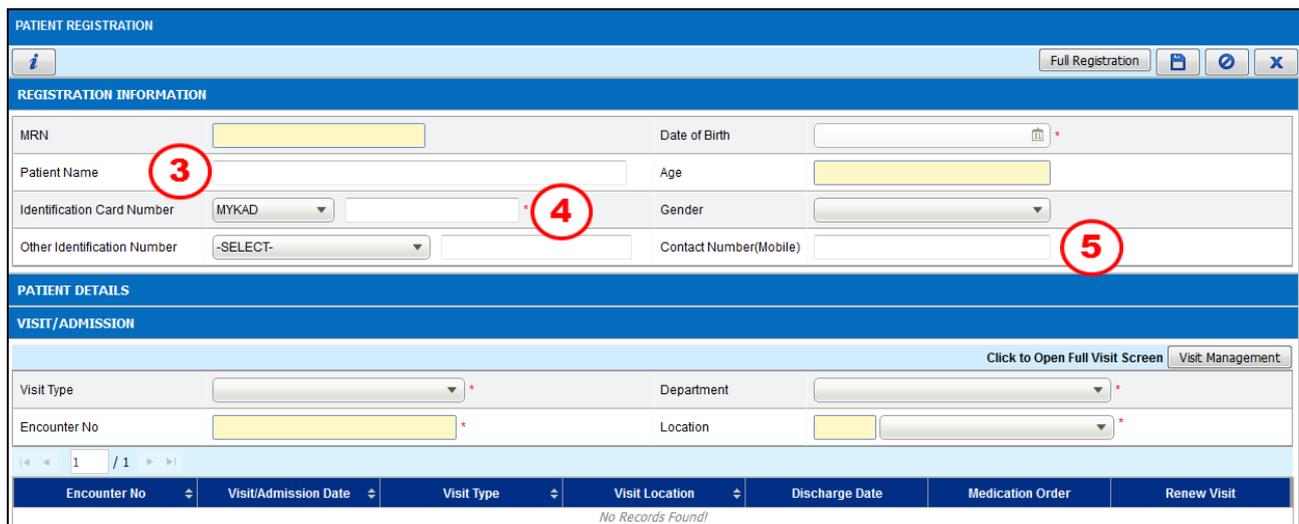


Figure 3.2-3 Registration Information

STEP 3

Enter **Patient Name**

STEP 4

Select from **Identification Card Number** drop down box:

- MYKAD
- MYKID

and enter the relevant number

Note

- After entering the Identification Card Number, the below details will be displayed:
 - Date of Birth (dd/mm/yy)
 - Age (Y M D)
 - Gender (Male/Female/Unknown)
- If MYKAD/MYKID is unavailable, user is required to select the Other Identification Number dropdown box:
 - BIRTH CERTIFICATE
 - DRIVING LICENSE
 - FATHER IC
 - MILITARY CARD NUMBER
 - MOTHER IC
 - OLD IC
 - PASSPORT
 - PENSION CARD
 - POLICE CARD NUMBER
 - UNKNOWN PATIENT
 - WORK PERMIT

and enter the relevant number.

STEP 5

Enter **Contact Number (Mobile)**

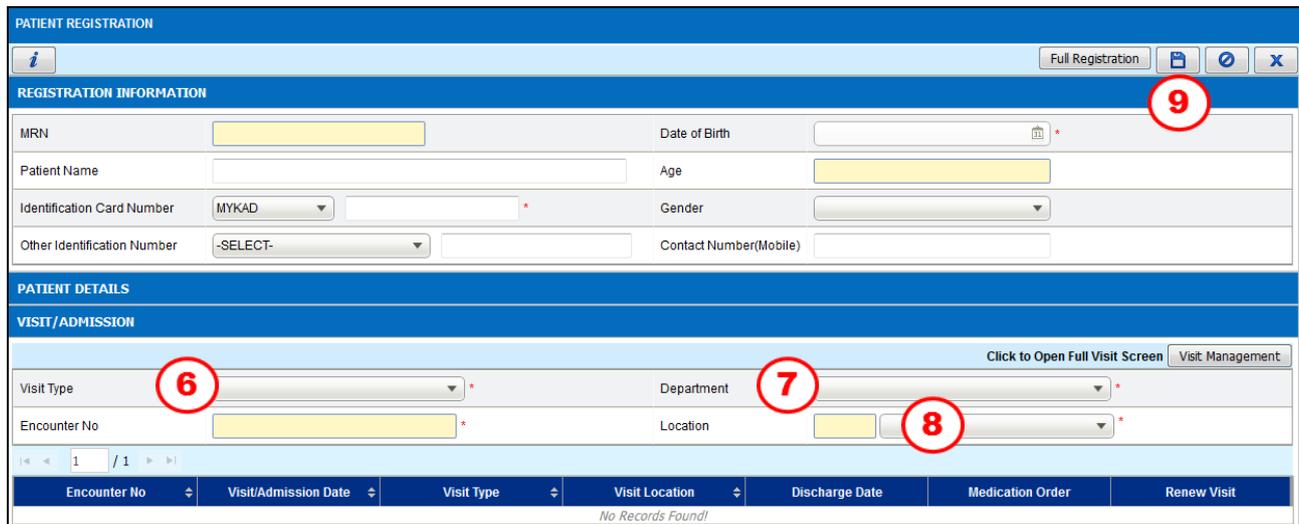


Figure 3.2-4 Visit/Admission

STEP 6

Select the **Visit Type** from dropdown box:

- Daycare
- Emergency
- Inpatient
- Outpatient
- Outsource
- SPUB
- Walk-in

STEP 7

Select the **Department** from dropdown box:

Note

Department will tie to the selected **Visit Type**.

STEP 8

Select **Location** from dropdown box

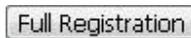
Note

Location will tie to the selected **Department**.

STEP 9

Click on the  button to save the record and medication order screen will display as per Figure 3.2.5

Note

- After clicking the save button, system will automatically generate the MRN (Medical Record Number) and ,  and  buttons will be enabled.
- Click on the  button to assess 'Visit Management' Screen. (Refer to Appendix 2).
- Another option to register a new patient is to click on the  button located under Patient Quick Registration that will display the same screen as Figure 3.2-3.

MEDICATION ORDER

Select Registered Patient: All
HKLM00066875
Dispensing Location: Farmasi Bekalan Wad - Rx Filling
New Patient X

Address: [Redacted]

Height: 150 cm Weight: 50 kg BMI/BSA: 22.2 / 1.44 m²

MyK: [Redacted]

Phone And Email: [Redacted]

Age: 32 Years 09 Months 14 Days

Diagnosis: [Redacted]

Gender: Female

No known Allergies

MRN: HKLM00066875

Upload Photo

(Last Updated: 20/03/2018) Nationality: Warganegara

VISIT/ADMISSION

Encounter No: 0001 Visit Type: Outpatient Location: Klinik Pakar 3 (Medical & Dermatology) Department: General Medicine

Breast Feeding Pregnant Week: [Dropdown]

VISIT RECORD

Original Prescription Serial Number: [Input]

Normal Order - DRUG DETAILS

Original Prescriber Name: [Input]

Drug: [Input]

Dosage: [Input]

Admin Route: [Input]

Frequency: [Input] Dosage Schedule: [Input]

Duration: [Input]

Start Date / Time: 20/03/2018 10:49 AM

End Date / Time: 20/03/2018 10:49 AM

Order Quantity: [Input]

Drug Indication: [Input]

Drug Remarks: [Input]

Available Qty: [Input]

Total Price: RM 0.00

Alert	Drug Name	Order Details	Order Qty	Drug Info
<input type="checkbox"/>				

Own Medication
 Ward Stock
 Patient Require Counselling

Figure 3.2-5 Medication Order

3.3 Therapeutic Drug Monitoring (TDM) Order

Perform these steps below to create new order for TDM

TDM Order screen allows Prescriber to place TDM Services order. The order will be sent to Pharmacist for verification and reporting.

TDM Order User Groups:

- **Authorised Pharmacist**

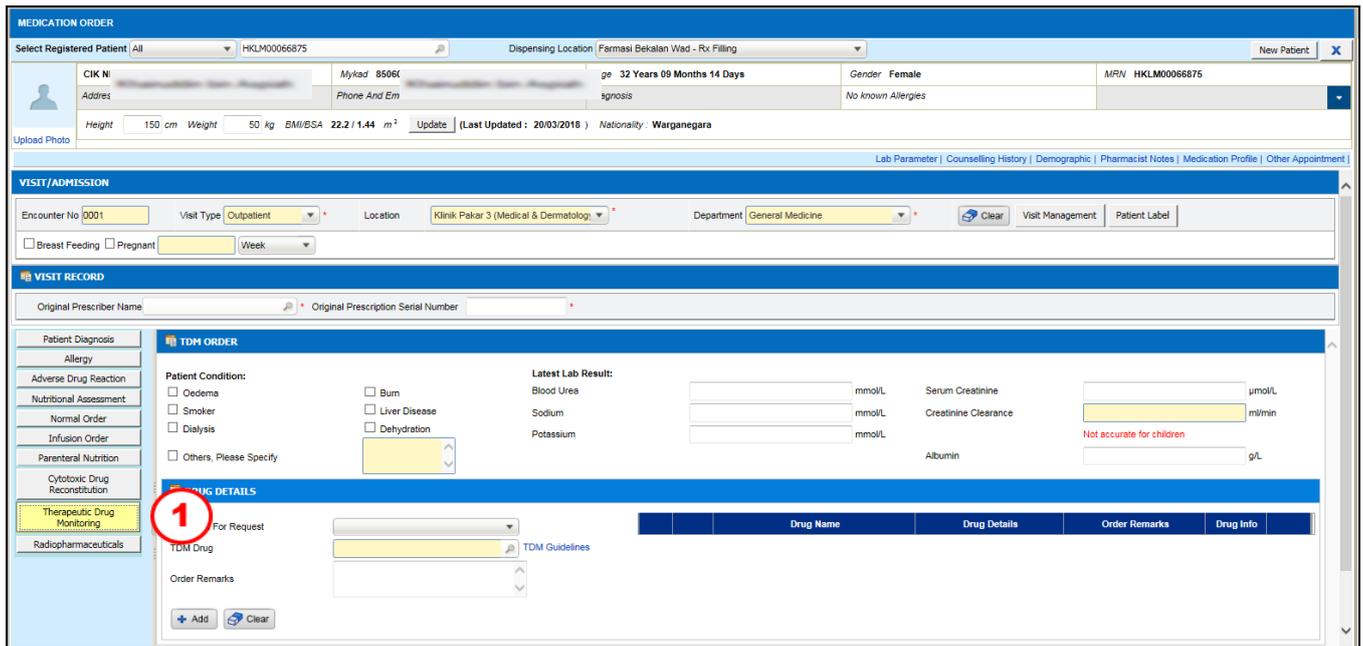


Figure 3.3-1 Medication Order

STEP 1

Click on the  button to create TDM order

Note

- User is allowed to update patient's height and weight and click on the  button and system will automatically calculate the BMI/BSA in m^2 .
- Visit Record will display Breast Feeding and Pregnant checkboxes only if the patient is a female.
- **User is allowing to do multiple TDM Order**

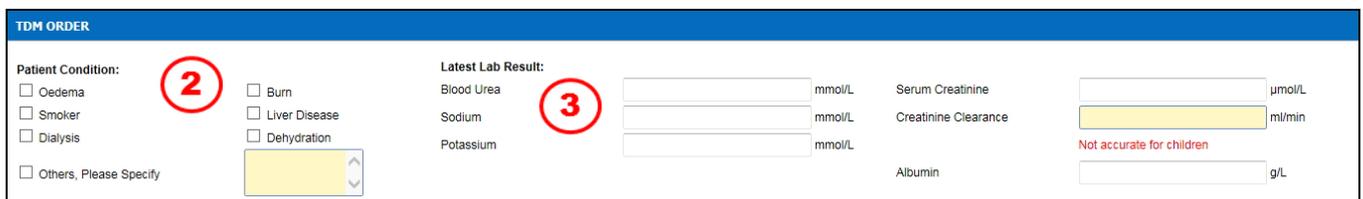


Figure 3.3-2 TDM Order

STEP 2

Select **Patient Condition** checkbox(es):

- Oedema
- Burn
- Smoker
- Liver Disease
- Dialysis

- Dehydration
- Others

Note

- User may select more than one condition.
- If 'Others' is selected, user needs to state the patient's condition in the text box provided.
- Fill in Order **Remarks** if applicable.

STEP 3

Enter **Latest Lab Result** which consists of:

- Blood Urea
- Sodium
- Potassium
- Serum Creatinine
- Creatinine Clearance
- Albumin

Note

- Creatinine Clearance will be automatically calculated by system in ml/min when Serum Creatinine is filled.
- Lab result data will be updated in the **Lab Result** hyperlink



Figure 3.3-3 TDM Drug Details

STEP 4

Select **Indication For Request** from dropdown box:

- Non Compliance
- Poor Response
- Therapeutic Monitoring
- Suspected Toxicity

Note

- Selected **Indication For Request** will be the search key for TDM Drug field.

STEP 5

Click on the  button to search for TDM drug based on:

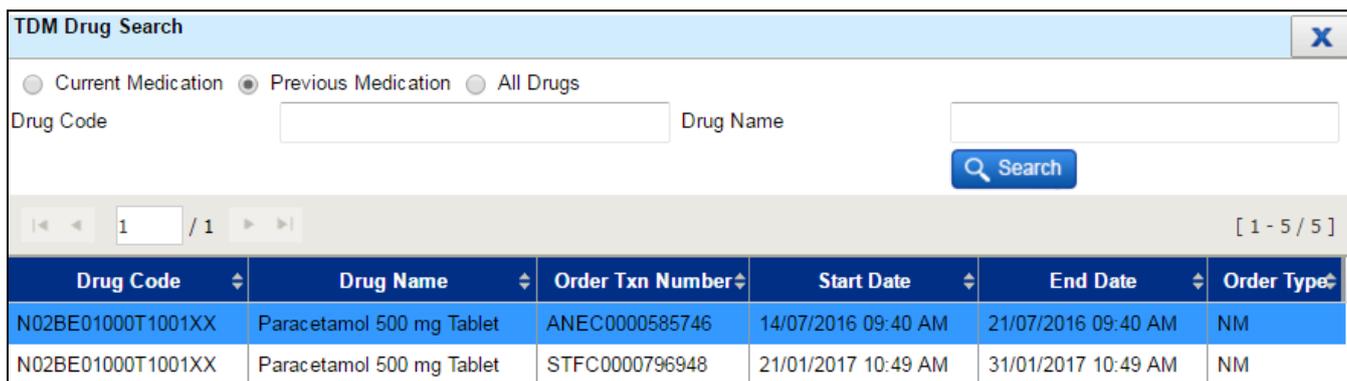
- Current Medication
- Previous Medication
- All Drugs

Note

- If the selected **Indication for Request** 'Non Compliance/ Poor Response/ Therapeutic Monitoring', TDM Drug search can be select from three (3) sources :
- Current Medication
 - Medication which patient still take and active in the system as drug classified as TDM drug only
- Previous Medication
 - Medication which patient taken before and completed in the system as drug classified as TDM drug only
- All Drugs
 - All medication classified in TDM drug
- If the selected TDM Drug is the Current Medication or Previous Medication, system will automatically display the

Drug Details as per Figure 3.3-4.

- Click on [TDM Guidelines](#) hyperlink to view TDM Guideline details on the selected TDM Drug as per Figure 3.3-5.
- TDM Guideline master setup is controlled by HQ.
- If the selected Indication for Request is 'Suspected Toxicity', TDM Drug search will default to 'All drugs' which comes from drugs that have been set in TDM Guideline master.
- The Drug Details field will be a free text field for user to enter the current dosage and frequency as per Figure 3.3-7.



TDM Drug Search

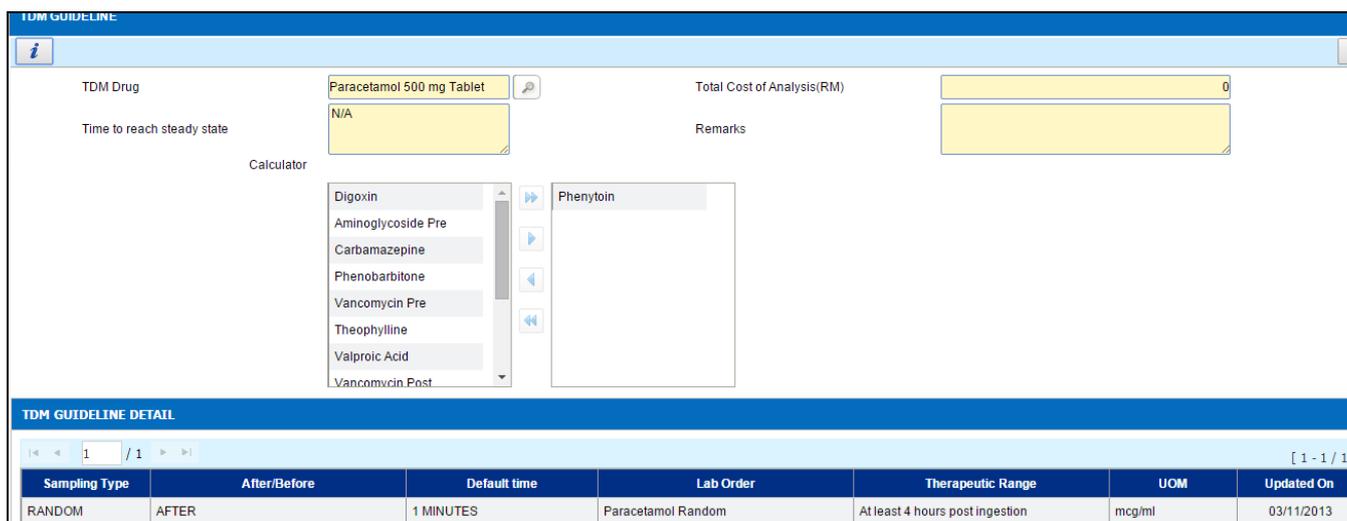
Current Medication
 Previous Medication
 All Drugs

Drug Code: Drug Name:

1 / 1 [1 - 5 / 5]

Drug Code	Drug Name	Order Txn Number	Start Date	End Date	Order Type
N02BE01000T1001XX	Paracetamol 500 mg Tablet	ANEC0000585746	14/07/2016 09:40 AM	21/07/2016 09:40 AM	NM
N02BE01000T1001XX	Paracetamol 500 mg Tablet	STFC0000796948	21/01/2017 10:49 AM	31/01/2017 10:49 AM	NM

Figure 3.3-4 Drug Search



TDM GUIDELINE

TDM Drug: Paracetamol 500 mg Tablet

Time to reach steady state: N/A

Calculator:

- Digoxin
- Aminoglycoside Pre
- Carbamazepine
- Phenobarbitone
- Vancomycin Pre
- Theophylline
- Valproic Acid
- Vancomycin Post

Phenytoin

Total Cost of Analysis(RM): 0

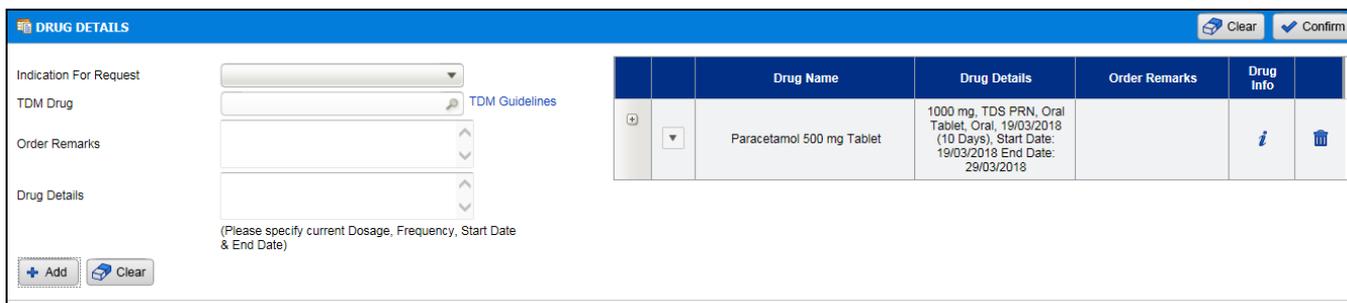
Remarks:

TDM GUIDELINE DETAIL

1 / 1 [1 - 1 / 1]

Sampling Type	After/Before	Default time	Lab Order	Therapeutic Range	UOM	Updated On
RANDOM	AFTER	1 MINUTES	Paracetamol Random	At least 4 hours post ingestion	mcg/ml	03/11/2013

Figure 3.3-5 TDM Guidelines



DRUG DETAILS

Indication For Request:

TDM Drug: [TDM Guidelines](#)

Order Remarks:

Drug Details:

(Please specify current Dosage, Frequency, Start Date & End Date)

Drug Name	Drug Details	Order Remarks	Drug Info
Paracetamol 500 mg Tablet	1000 mg, TDS PRN, Oral Tablet, Oral, 19/03/2018 (10 Days), Start Date: 19/03/2018 End Date: 29/03/2018		i <input type="button" value="Delete"/>

Figure 3.3-6 Drug Details

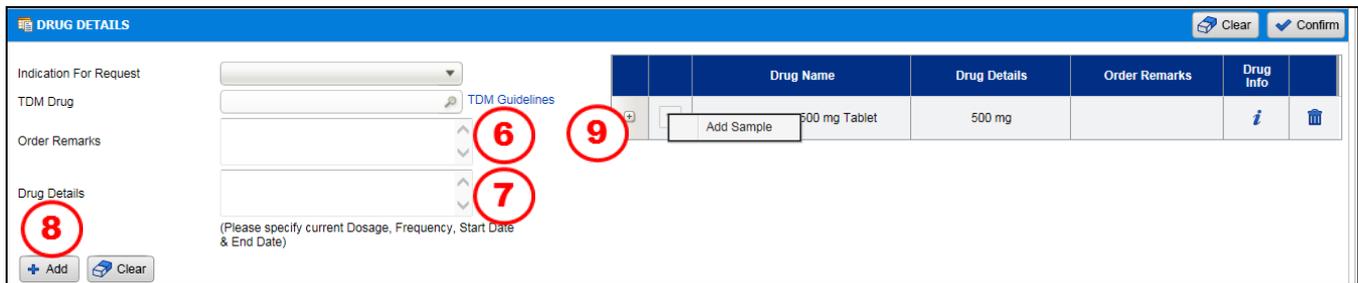


Figure 3.3-7 Drug Details

STEP 6

Fill the **Order Remark** if necessarily.

STEP 7

Fill the **Drug Detail**.

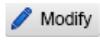
Note

- Please specify current **Dosage, Frequency, Start Date & End Date** if choose 'All Drug' for TDM Drug Request.

STEP 8

Click on the  button to added drug and will be display as Figure 3.3-7

Note

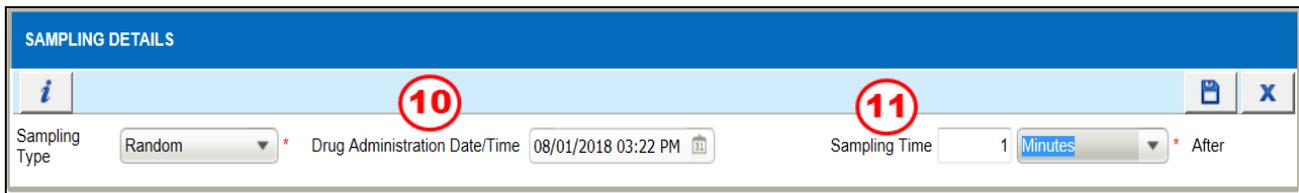
- Click on the  button to change any information.
- Click on the  button to clear the drug detail part before added any new information.

STEP 9

Right click on the  to fill in sampling details, sampling details screen will be displayed as Figure 3.3-8

Note

- There are several sampling types that can be choose
 - Post 1
 - Post 2
 - Post
 - Pre
 - Random
- Screen for Sampling Details will be displayed differently based on selected 'Indication For Request' below:
- Sampling Type will be displayed differently based on chosen medication together from TDM guideline Example:
 - Paracetamol for random and pre-sampling.
 - Vancomycin for Pre, post and random sampling
- If 'Suspected Toxicity', Sampling Type is defaulted to 'Random' and the 'Suggested Sampling Date/Time' field will be displayed as per Figure 3.3-9.



SAMPLING DETAILS

Sampling Type: Random * Drug Administration Date/Time: 08/01/2018 03:22 PM Sampling Time: 1 Minutes * After

Figure 3.3-8 Sampling Details

STEP 10

Click on the  button to select **Drug Administration Date/Time**

Note

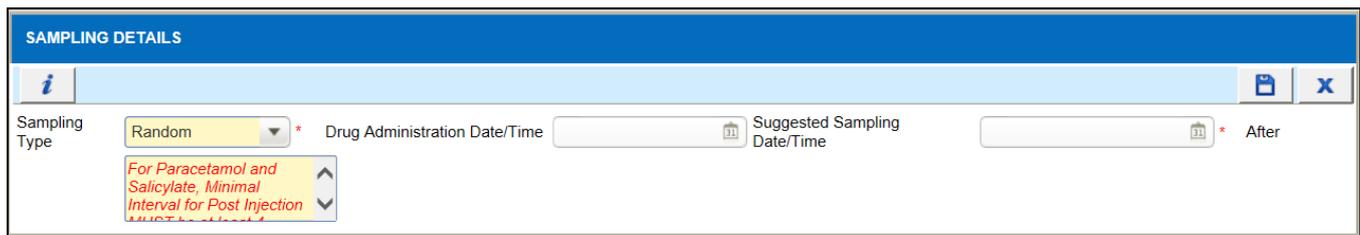
Drug Administration Date/Time” to be default as empty and change the time format to 12 Hour format

STEP 11

Select **Sampling Time** from dropdown box and enter **Interval** and select Hours/Minutes

Note

The Interval field is only enable if user choose the Indication for Request as Non Compliance/Poor Response/Therapeutic Monitoring.



SAMPLING DETAILS

Sampling Type: Random * Drug Administration Date/Time: Suggested Sampling Date/Time: * After

For Paracetamol and Salicylate, Minimal Interval for Post Injection

Figure 3.3-9 Sampling Details



DRUG DETAILS

Indication For Request: TDM Drug: Order Remarks: Drug Details: (Please specify current Dosage, Frequency, Start Date & End Date)

Drug Name	Drug Details	Order Remarks	Drug Info
Paracetamol 500 mg Tablet	1000 mg, TDS PRN, Oral Tablet, Oral, 19/03/2018 (10 Days), Start Date: 19/03/2018 End Date: 29/03/2018		

Sampling Type	Drug Administration Date/Time	Suggested Sampling Date/Time	Suggested Sampling Date/Time	Lab Test Order
Random	21/03/2018 11:44 AM	30 Minutes	21/03/2018 12:14 PM	Paracetamol Random

Figure 3.3-10 Drug Details

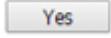
STEP 12

Click on the  to view the sampling details added as Figure 3.3.10

STEP 13

Click on the  to confirm TDM order and TDM Order No. will be generated.

Note

- Click on the  button to confirm the record as Figure 3.3-11

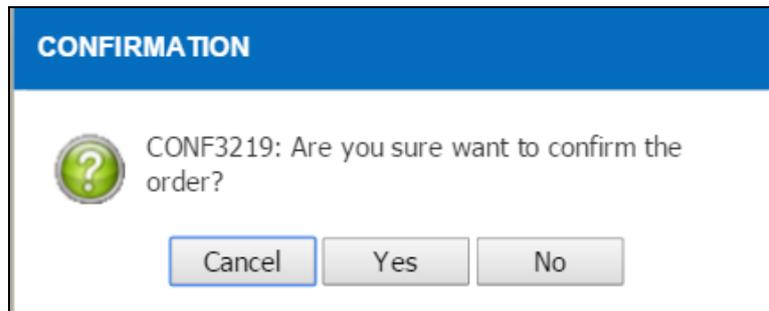


Figure 3.3-11 Confirmation alert message

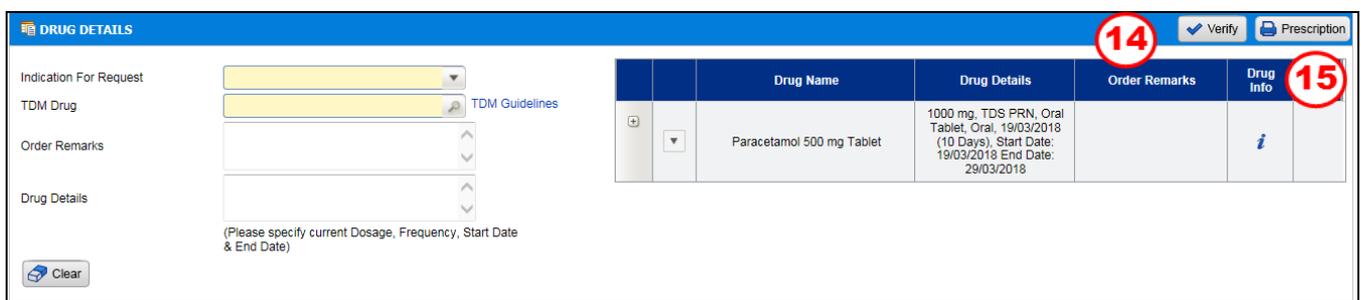
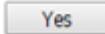


Figure 3.3-12 Verify Sampling Details

STEP 14

Click on the  button to verify order

Note

- Order Status changed to “Verified” as Figure 3.3-14
- Users not allowed to update sampling details if order status is “Verified”.
- Click on the  button to verify the record.

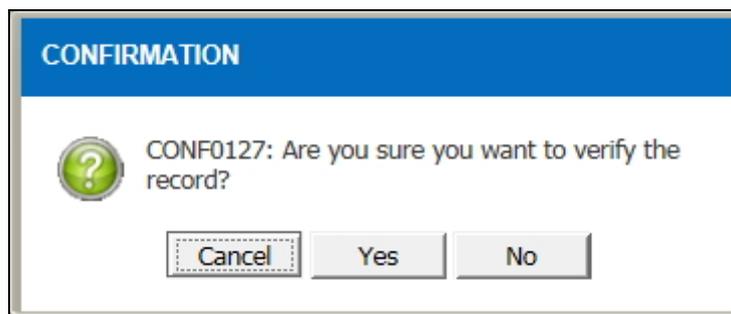


Figure 3.3-13 Confirmation Alert Message

STEP 15

Click on the  button to print TDM Request Form as per Figure 3.3-15

Note

- Click on the  button to clear all entered data.
- Click on the  button to create a new TDM Order and the system will reset all fields in TDM Order screen as Figure 3.3-14

DRUG DETAILS		New Prescription			
Indication For Request	<input type="text"/>				
TDM Drug	<input type="text"/> TDM Guidelines	Drug Name	Drug Details	Order Remarks	Drug Info
Order Remarks	<input type="text"/>	Paracetamol 500 mg Tablet	1000 mg TDS PRN, Oral Tablet, Oral, 19/03/2018 (10 Days), Start Date: 19/03/2018 End Date: 29/03/2018		<i>i</i>
Drug Details	<input type="text"/>				
(Please specify current Dosage, Frequency, Start Date & End Date)					
<input type="button" value="Clear"/>					
SAMPLE MANAGEMENT		PROCEED TO TDM REPORTING			
		Drug Name	Drug Details	Order Remarks	Drug Info
		Paracetamol 500 mg Tablet	500 mg		<i>i</i>
					Status
					Verified

Figure 3.3-14 Verified Sampling Details



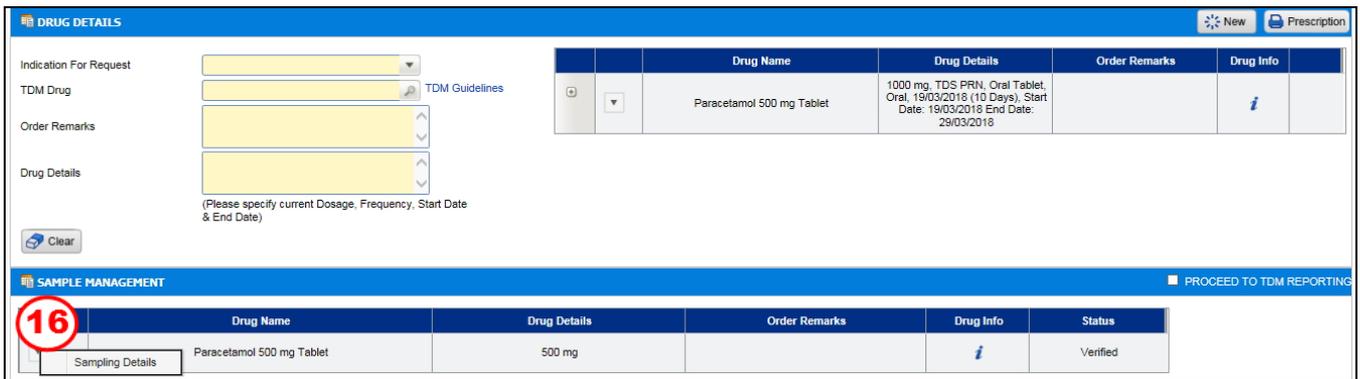
CLINICAL PHARMACOKINETICS SERVICES
Therapeutic Drug Monitoring (TDM) Request Form

Ordered By: TDM Order No:

Ordered Date/Time: 09/01/2018 11:45

PATIENT DETAILS					
Name:	<input type="text"/>	MRN NO:	HMIRI00099046	IC:	<input type="text"/>
				Race:	<input type="text"/>
Age:	24 Years 08 Months	Sex:	Male	Ward/Unit:	WA <input type="text"/>
Weight:	77 kg	Height:	177 cm		
LATEST LAB RESULT					
Blood Urea	Sodium	Potassium	Serum Creatinine	Creatinine Clearance	Albumin
PATIENT CONDITION					
Oedema:	YES	Smoker:	NO	Dehydration:	NO
Dialysis:	NO	Burn:	NO	Liver Disease:	NO
Others:	NO	Details:			
TDM DRUG DETAILS					
No	TDM No	Drug Name	Drug Details	Indication Request	Remarks
1	TDM0000003311	Paracetamol 500 mg Tablet	500 mg Tablet	Suspected Toxicity	
	Sample Type	Lab Test Order	Drug Administration Date/Time	Suggested Sampling Date/Time	Interval
	RANDOM	Paracetamol Random	2018-01-09 11:41:00	2018-01-09 12:41:00	1 Hours

Figure 3.3-15 TDM Request Form



Drug Name	Drug Details	Order Remarks	Drug Info
Paracetamol 500 mg Tablet	1000 mg, TDS PRN, Oral Tablet, Oral, 19/03/2018 (10 Days), Start Date: 19/03/2018 End Date: 29/03/2018		i

Drug Name	Drug Details	Order Remarks	Drug Info	Status
Paracetamol 500 mg Tablet	500 mg		i	Verified

Figure 3.3-16 Sampling Details

STEP 16

Right click on the  fill in sample management details, sample management details pop up screen will be displayed as Figure 3.3.17

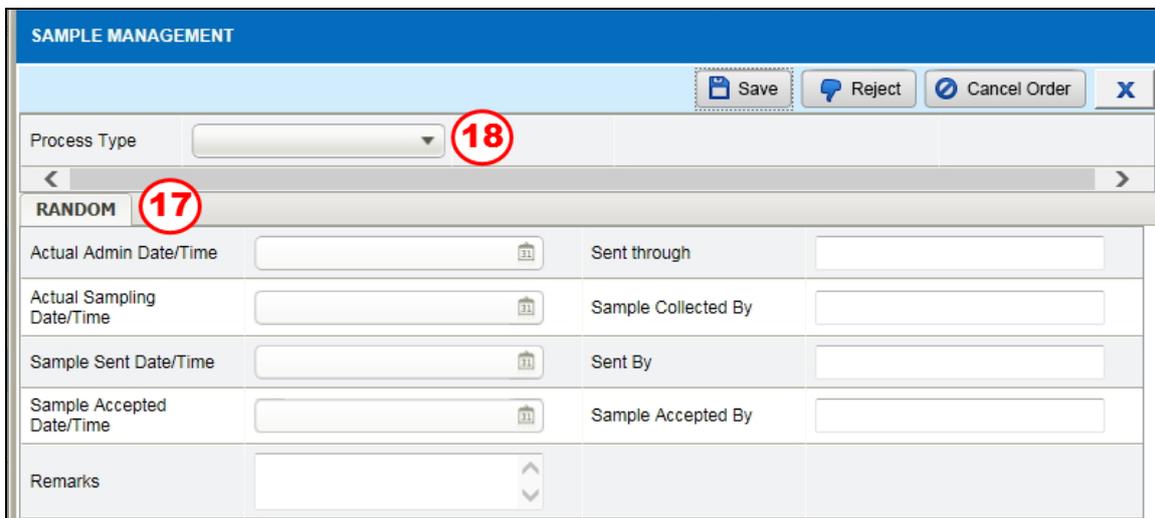


Figure 3.3-17 Sample Management

STEP 17

Enter details in these fields:

- Actual Admin Date/Time
- Actual Sampling Date/Time
- Sample Sent Date/Time
- Sample Accepted Date/Time
- Remarks
- Sent Through
- Sample Collected By
- Sent By
- Sample Accepted By

Note

- If have more than one sample, record will be display in the next tab.

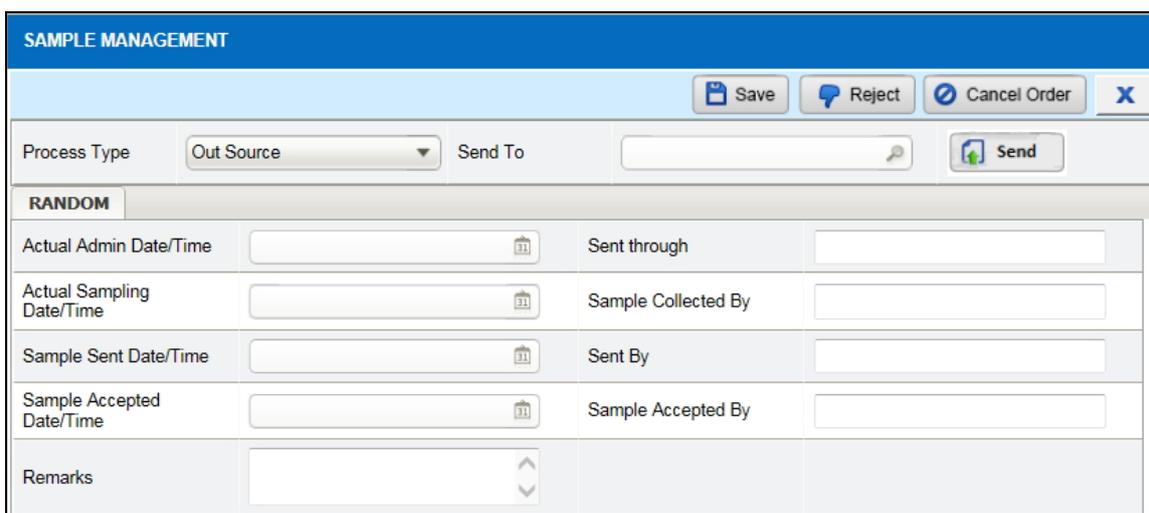
STEP 18

Select **Process Type** from dropdown box:

- Lab Based
- Outsource
- Pharmacy Based

Note

- If Process Type is “Outsource”, user needs to select which facility to send the order to under Auto complete search drop down and click on the  button.



The screenshot shows the 'SAMPLE MANAGEMENT' form with the following fields and controls:

- Buttons: Save, Reject, Cancel Order, X
- Process Type: Out Source (dropdown)
- Send To: (text input)
- Send: (button)
- Section: RANDOM
- Actual Admin Date/Time: (calendar icon)
- Sent through: (text input)
- Actual Sampling Date/Time: (calendar icon)
- Sample Collected By: (text input)
- Sample Sent Date/Time: (calendar icon)
- Sent By: (text input)
- Sample Accepted Date/Time: (calendar icon)
- Sample Accepted By: (text input)
- Remarks: (text area)

Figure 3.3-18 Sample Management – Out Source



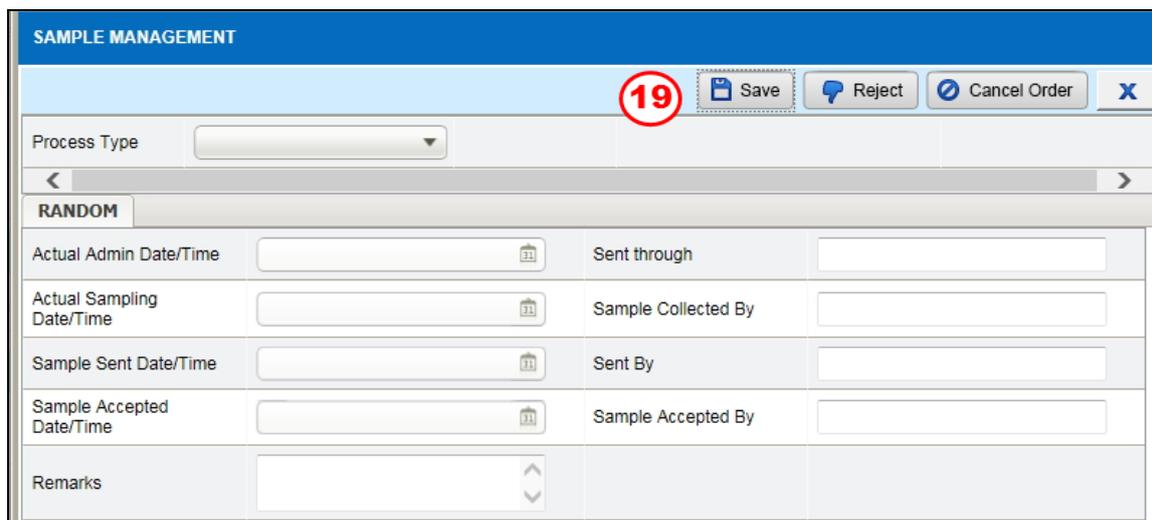
The screenshot shows the 'Search Other Facility' dialog box with the following details:

- Facility Name: (text input)
- Search: (button)
- Refresh: (circular arrow icon)
- Page: 1 / 113
- Records: [1 - 10 / 1127]
- Table with columns: Facility Name, State

Facility Name	State
Hospital Alor Gajah	Melaka
Hospital Ampang	Selangor
Hospital Bahagia Ulu Kinta	Perak
Hospital Balik Pulau	Pulau Pinang
Hospital Baling	Kedah
Hospital Banting	Selangor
Hospital Batu Gajah	Perak
Hospital Bau	Sarawak
Hospital Beaufort	Sabah
Hospital Beluran	Sabah

Figure 3.3-19 search Other Facility

- Click on the  button to reject the sampling details. User needs to place a new order.
- Click on the  button to cancel the order. User may not need to place new order.



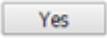
SAMPLE MANAGEMENT			
Process Type		[Dropdown]	
RANDOM		[Dropdown]	
Actual Admin Date/Time	[Date/Time]	Sent through	[Text]
Actual Sampling Date/Time	[Date/Time]	Sample Collected By	[Text]
Sample Sent Date/Time	[Date/Time]	Sent By	[Text]
Sample Accepted Date/Time	[Date/Time]	Sample Accepted By	[Text]
Remarks	[Text]		

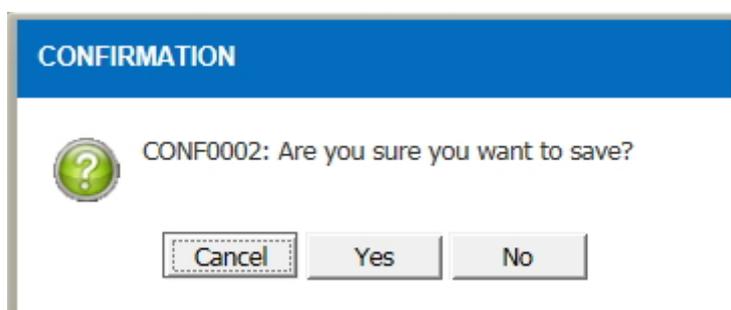
Figure 3.3-20 Save Sample Management

STEP 19

Click on the  button to save record

Note

- Click on the  button to save the record.
- Order Status changed to "Sample Accepted" as Figure 3.3-22



CONFIRMATION

CONF0002: Are you sure you want to save?

Figure 3.3-21 Confirmation Alert Message

DRUG DETAILS					
Indication For Request	<input type="text"/>				
TDM Drug	<input type="text"/> TDM Guidelines				
Order Remarks	<input type="text"/>				
Drug Details	<input type="text"/>				
(Please specify current Dosage, Frequency, Start Date & End Date)					
<input type="button" value="Clear"/>					
SAMPLE MANAGEMENT					
20 <input type="checkbox"/> PROCEED TO TDM REPORTING					
Drug Name	Drug Details	Order Remarks	Drug Info	Status	
Paracetamol 500 mg Tablet	500 mg		<i>i</i>	Sample Accepted	

Figure 3.3-22 Proceed to Reporting

STEP 20

Select the PROCEED TO TDM REPORTING to perform the TDM reporting.

Note

- Click on the button to proceed to the TDM reporting and screen will be displayed as Figure 3.3-24

CONFIRMATION



CONF0152: Are you sure you want to proceed to TDM reporting?

Figure 3.3-23 Confirmation Alert Message

REPORTING

Mykac Age 32 Years 04 Months 10 Days Gender Female M/RN HPSF00012700

Address Phone And Email Diagnosis No known Allergies

Height 168 cm Weight 68 kg BMI/BSA 24.1 / 1.8 m² Update (Last Updated: 07/09/2017) Nationality: Warganegara

Encounter No: 0007 Visit Date: 07/09/2017 Attending Practitioner: Visit Location: KLINIK NEFROLOGI

Lab Parameter | Demographic | Pharmacist Notes | Medication Profile | TDM Guidelines

+ Add CP2

[1 - 1 / 1]

TDM No.	Drug Name	Drug Details	Actual Sampling Time	Actual Drug Admin Date/Time	Reporting	Result Value					Toxic	Recommendation Type	Recommendation accepted
						Pre	Post	Post1	Post2	Random			
TDM0000004767	Amikacin 500mg/2ml Injection	500	07/09/2017 14:18	06/09/2017 14:49	Details 21						NO		

Pharmacist Note

2000 characters allowed

Remarks

Total Cost of Analysis: 0

TDM service Charge in RM

Save Confirm

+ Place TDM Order Save

Figure 3.3-25 TDM Reporting

STEP 21

Click on [Details](#) hyperlink to display Reporting screen

Note

- User needs to enter sample details for pre-sample, post sample or random sample based on TDM order.
- Latest Lab Result will display the latest lab results recorded for:
 - Blood Urea
 - Sodium
 - Potassium
 - Serum Creatinine
 - Creatinine Clearance
 - Albumin

REPORTING

i
X

<p>Pre Sample</p> <p>Result Value <input type="text"/> <input type="button" value="v"/> 22</p> <p>Reported By <input type="text"/> Details</p> <p>Post Sample</p> <p>Result Value <input type="text"/> <input type="button" value="v"/></p> <p>Reported By <input type="text"/> Details</p> <p>Random Sample</p> <p>Result Value <input type="text"/> <input type="button" value="v"/></p> <p>Reported By <input type="text"/> Details</p> <p>Calculator <input type="button" value="v"/> 23</p> <p>Pharmacokinetics Profile <input type="text"/> 24</p> <p>Recommendation Type <input type="button" value="v"/> 25</p> <p>Toxic <input type="checkbox"/> No 26</p>	<p>Latest Lab Result:</p> <p>Blood Urea <input type="text"/> mmol/L</p> <p>Sodium <input type="text"/> mmol/L</p> <p>Potassium <input type="text"/> mmol/L</p> <p>Serum Creatinine <input type="text"/> µmol/L</p> <p>Creatinine Clearance <input type="text"/> ml/min <small>Not accurate for Children</small></p> <p>Albumin <input type="text"/> g/L</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

27

Figure 3.3-26 Reporting Detail

DETAILS

i
X

Reference Range	:	TROUGH : < 10 mcg / ml ; < 5 mcg/ ml (children)
Sample Collected Date/Time	:	06/09/2017 14:49
Actual Drug Admin Date/Time	:	06/09/2017 14:49
Out Source	:	NO

Figure 3.3-27 Sample Details

STEP 22

Enter sample details as below:

- Result Value
- Resulted By

Note

Click on [Details](#) hyperlink to view sample details. Sample Details consists of:

- Reference Range
- Sample Collected Date/Time
- Actual Drug Admin Date/Time
- Outsource

STEP 23

Select calculator from dropdown box. Please refer to [TDM Calculator](#) to view sample calculator calculation.

STEP 24

Enter **Pharmacokinetics Profile**

Notes

Pharmacokinetics Profile field will display data entered from the TDM calculator and also can be edited.

STEP 25

Select **Recommendation Type** from dropdown box:

- Increase The Dose
- Maintain The Dose
- Reduce The Dose
- Refer to Pharmacist Notes
- Stop The Dose
- Withhold The Dose

Notes

Recommendation Type will be copied and displayed in Pharmacist Notes.

STEP 26

Select **Toxic**:

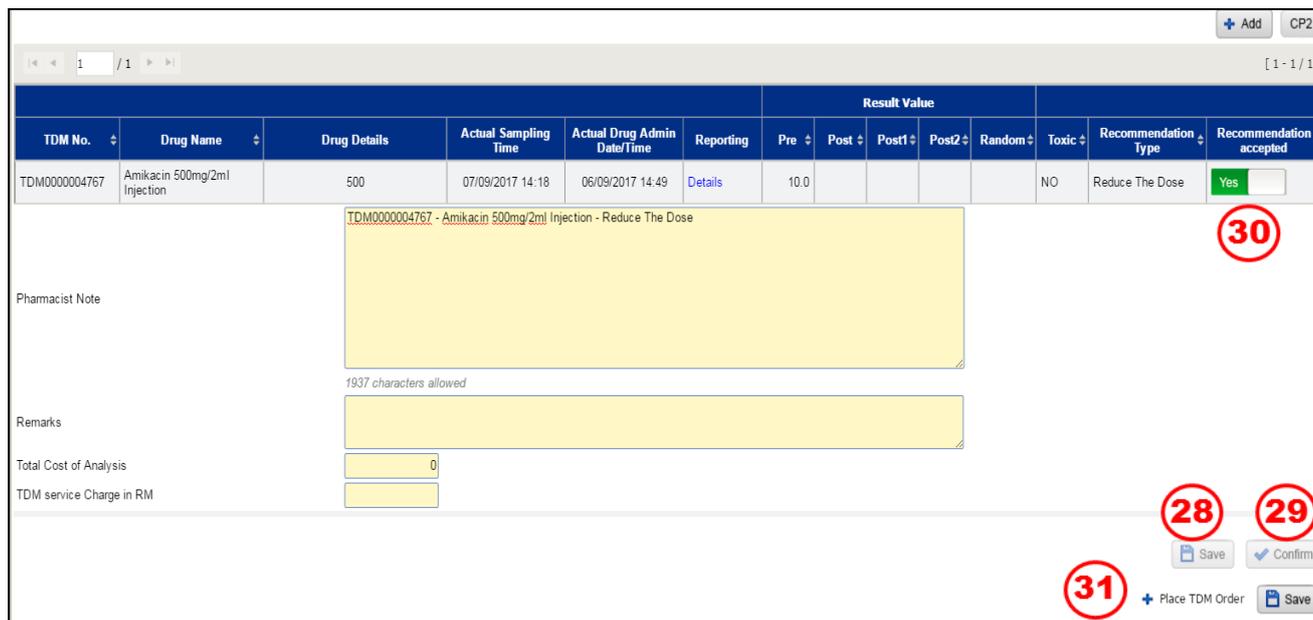
- Yes
- No

STEP 27

Click on the button to proceed with TDM reporting process

Note

- Pharmacist Notes field will automatically display:
 - Drug Name
 - Recommendation Type
- User may edit Pharmacist Note.
- Enter Remarks if applicable.
- Total Cost of Analysis will be based on TDM Guideline master setup.



TDM No.	Drug Name	Drug Details	Actual Sampling Time	Actual Drug Admin Date/Time	Reporting	Result Value					Toxic	Recommendation Type	Recommendation accepted
						Pre	Post	Post1	Post2	Random			
TDM0000004767	Amikacin 500mg/2ml Injection	500	07/09/2017 14:18	06/09/2017 14:49	Details	10.0					NO	Reduce The Dose	<input checked="" type="checkbox"/>

Pharmacist Note

Remarks

Total Cost of Analysis: 0

TDM service Charge in RM

Buttons: Save, Confirm, + Place TDM Order, Save

Figure 3.3-28 TDM Reporting

STEP 28

Click on the  button to save report

STEP 29

Click on the  button to confirm report

Note

The  button and  button will be enabled.

STEP 30

Click 'Yes' or 'No' at the button under **Recommendation accepted**

STEP 31

Click on the  button to authorize the report

Note

- The status will change to "Result Viewed".
- Recommendation Accepted must be select and Save to make sure TDM Process completed and data flow to the report (data mining) accurate.
- Click on the  button to place new TDM order.
- Click on the  button to print TDM Report



CLINICAL PHARMACOKINETICS SERVICES
Therapeutic Drug Monitoring (TDM) Report
Hospital Pakar Sultanah Fatimah, Muar

Report No: RPT0000002341

PATIENT DETAILS

Name: [Redacted] IL MRN NO : HPSF00137158 IC : [Redacted]
Age : 25 Years 08 Months 25 Days Sex : Female Race : Malay
Weight : 80 Kg Height : 155 Cm Ward/Unit : WAD 9 (MED - P)

No	TDM No	Drug Name	Drug Details	Indication Request	Recommendation Type	Recommendation Accepted	Toxic
1	TDM0000004684	Phenytoin Sodium 100 mg Capsule	300 mg, ON (every night), Oral Capsule, Oral, 26/03/2017 (7 Days), Start Date: 26/03/2017 End Date: 02/04/2017	Therapeutic Monitoring		Yes	No

Sampling Id	Sample Type	Actual Sampling Date Time	Actual Drug Admin Date Time	Result Value	Therapeutic Range
HPSF/SM/0000004848	RANDOM	3/27/17 12:00 AM	3/27/17 3:28 PM		TROUGH : 10 – 20 mcg /ml

Pharmacist Note: DRUG REGIMEN MEASURED LEVEL (mcg/ml) Adjusted level (mcg/ml)
LOADING DOSE IV PHENYTOIN 1G +5.7 14.61
100mg TDS
*Adjusted level was be calculated due to patient on dialysis and hypoalbumin
DESIRED THERAPEUTIC RANGE:
Phenytoin: 10-20 mcg/ml

Comments:
Adjusted level of phenytoin is WITHIN the therapeutic range.
May continue with maintenance of IV Phenytoin 100mg TDS.
Kindly monitor patient's liver function and albumin level.
Please repeat TDM (pre dose) only if patient fits.
Thank you.

Printed Date : 05/09/2017 Printed By : [Redacted] Unit Name : STOR FARMASI Source : PhIS

Figure 3.3-29 TDM Report

3.4 External TDM

3.4.1 External TDM Online

External TDM module is for user to record external TDM resulting (Outsource) via online or offline. It will be recorded online if both facilities use PhIS to perform TDM processes.

External Notification	
External TDM Request Received:	1
External TDM Result Received:	0
Online SPUB R1 Request Received:	0

Figure 3.4.1-1 External Notification

STEP 1

Click on the **External TDM Result Received**  button to view Outsource information

OUTSOURCE LISTING							
Hosp/Clinic	Mrn No	Patient Name	Patient ID	TDM Drug	Sample Type	Date/Time	Register
<input type="checkbox"/> Hospital Pakar Sultanah Fatimah, Muar	HPSF00007006	[Redacted]	[Redacted]	carBAMAZepine 200mg Tablet	RANDOM	22/07/2014 13:26	Register
<input type="checkbox"/> Hospital Pakar Sultanah Fatimah, Muar	HPSF00017231	[Redacted]	[Redacted]	Sodium Valproate 200 mg Tablet	PRE	22/09/2014 15:48	Register

Figure 3.4.1-2 Outsource Listing

STEP 2

Click on **Register** hyperlink to register the patient in the system

Note

The status will change to 'Registered' as per Figure 3.4.1-2

OUTSOURCE LISTING							
Hosp/Clinic	Mrn No	Patient Name	Patient ID	TDM Drug	Sample Type	Date/Time	Register
<input type="checkbox"/> Hospital Pakar Sultanah Fatimah, Muar	HPSF00007006	[Redacted]	910801126176	carBAMAZepine 200mg Tablet	RANDOM	22/07/2014 13:26	Register
<input checked="" type="checkbox"/> Hospital Pakar Sultanah Fatimah, Muar	HPSF00017231	[Redacted]	790719015422	Sodium Valproate 200 mg Tablet	PRE	22/09/2014 15:48	Registered

Figure 3.4.1-3 Outsource Listing – Registered Patient

STEP 3

Click on the checkbox for selected patient

STEP 4

Click on the  button to save the record

Note

Registered patient will be uploaded to the External TDM listing page.

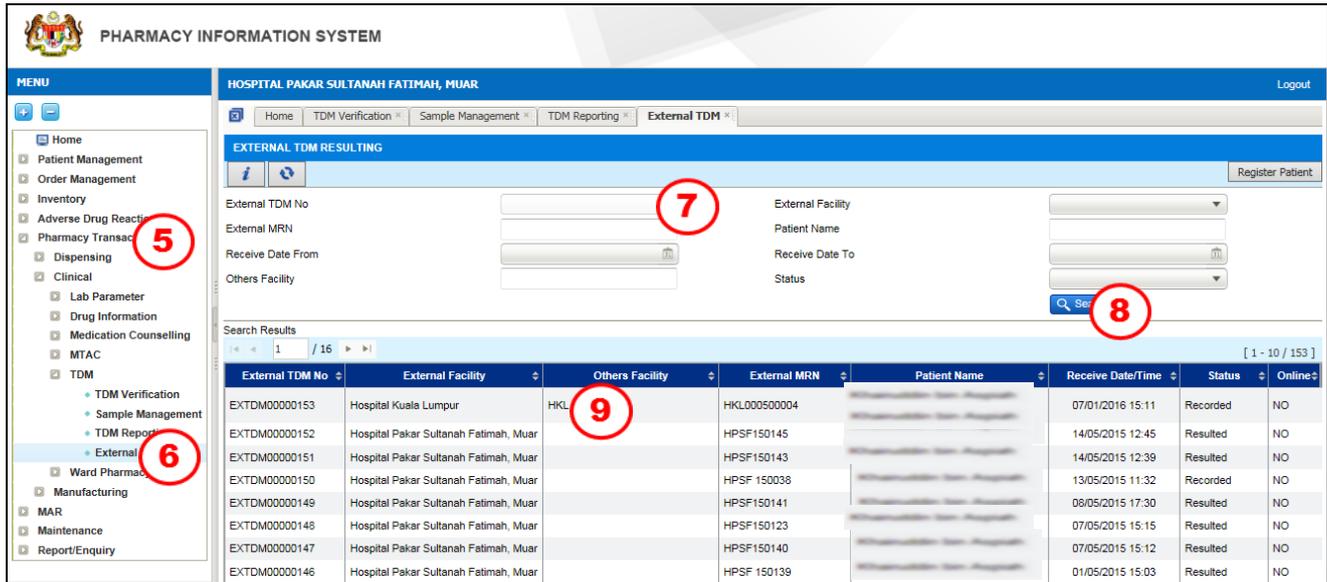


Figure 3.4.1-4 External TDM Listing Page

STEP 5

Click on 'Pharmacy Transaction' menu follow by 'Clinical' sub-menu

STEP 6

Click on 'TDM' and click on 'External TDM' function

STEP 7

Search for patient records by:

- External TDM No.
- External Facility
- External MRN
- Patient Name
- Receive Date From
- Receive Date To
- Others Facility
- Status
 - Recorded
 - Rejected
 - Resulted

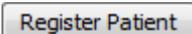
STEP 8

Click on the  button to search for patient records

STEP 9

Double-click on the selected patient and External TDM Resulting screen will be displayed as per Figure 3.4.1-5

Note

 button is for offline External TDM (refer to [section 3.4.2 External TDM Offline](#))

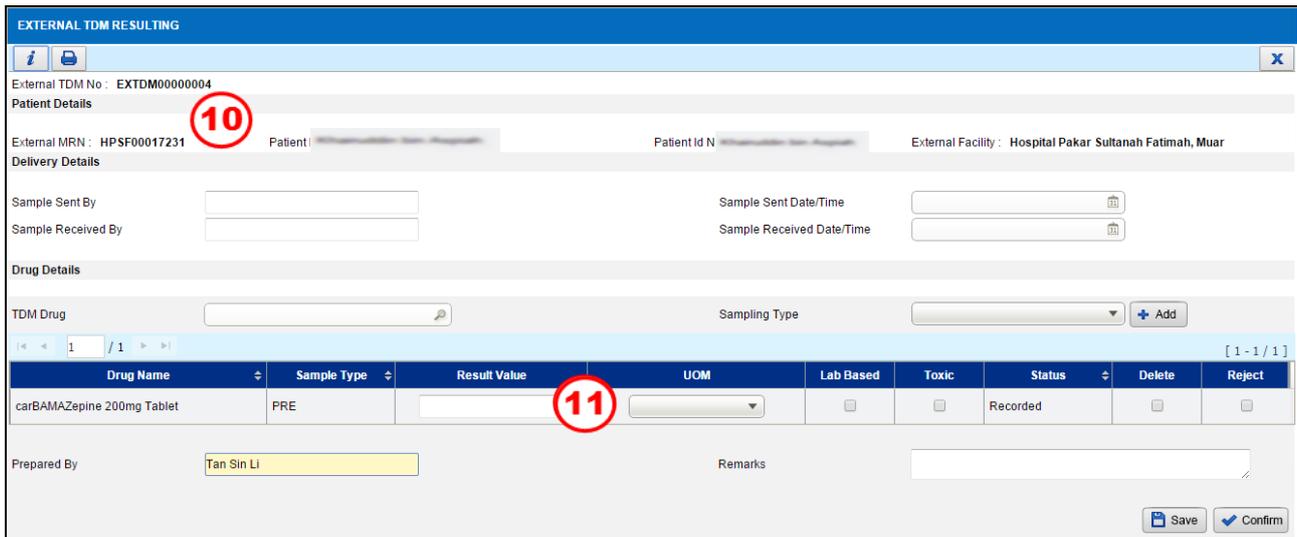


Figure 3.4.1-5 External TDM Resulting

STEP 10

Enter **Delivery Details** as below:

- a) Sample Sent By
- b) Sample Sent Date/Time
- c) Sample Received By
- d) Sample Received Date/Time

STEP 11

Enter **Result Value** and select **UOM** from dropdown box :

- mcg/ml
- mg/dl
- mmol/l
- ng/ml

Note

- Select on **Lab Based** checkbox if TDM resulting process is done at a laboratory.
- Select on **Toxic** checkbox if TDM results show toxicity for selected patient.
- Select on **Reject** checkbox to reject sampling received.
- Select on **Delete** checkbox to delete TDM order.
- Enter **Remarks** if applicable.

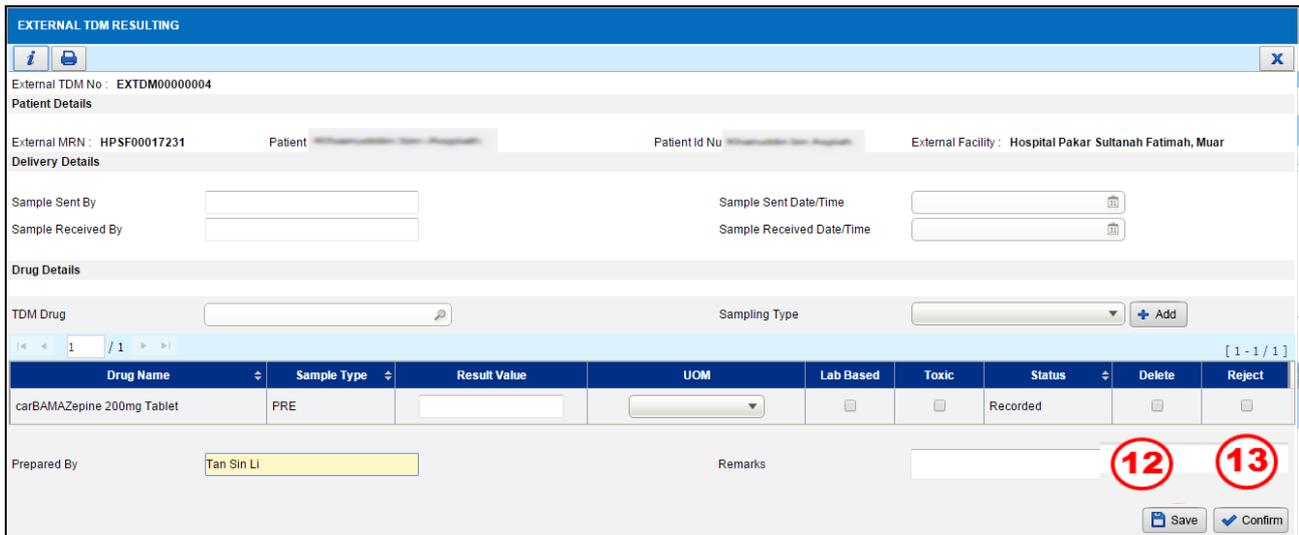


Figure 3.4.1-6 External TDM Resulting

STEP 12

Click on the  button to save external TDM resulting

STEP 13

Click on the  button to confirm external TDM resulting

Note

- The status will change to “Resulted”.
- Outsource TDM Resulting will be sent back to the requester.

To receive an **External TDM Result Received**:

- Click on the **External TDM Result Received**  button to view the outsource listing.
- Select on checkbox(es) on selected outsource request.
- Click on the  button to upload the patient record in order to proceed with TDM Reporting processes. (refer to [section 3.3 Therapeutic Drug Monitoring \(TDM\) Order](#))

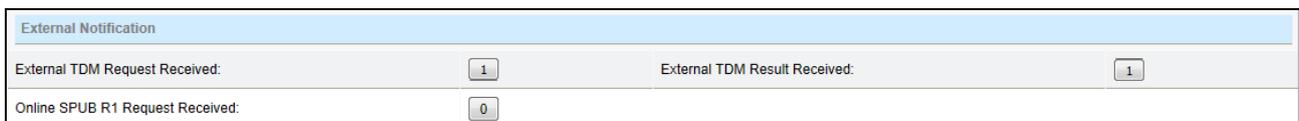
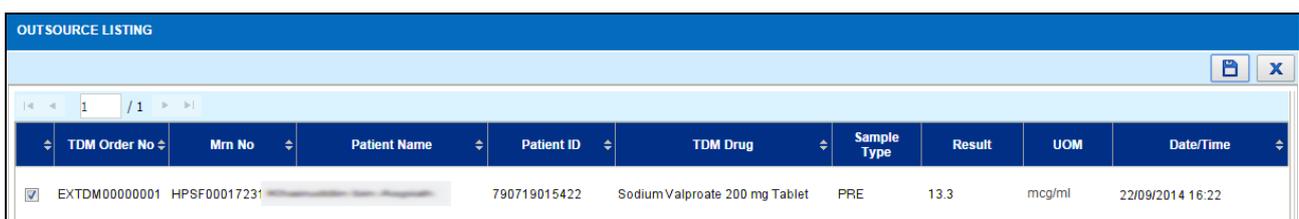


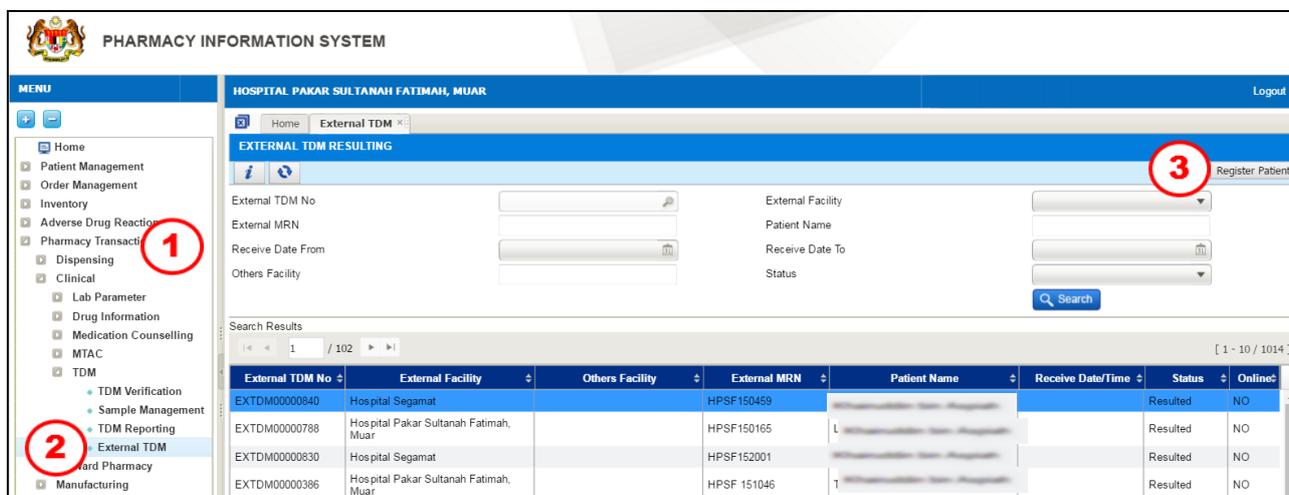
Figure 3.4.1-7 External Notification



TDM Order No	Mrn No	Patient Name	Patient ID	TDM Drug	Sample Type	Result	UOM	Date/Time
<input checked="" type="checkbox"/>	EXTDM00000001	HPSF00017231	790719015422	Sodium Valproate 200 mg Tablet	PRE	13.3	mcg/ml	22/09/2014 16:22

Figure 3.4.1-8 Outsource Listing

3.4.2 External TDM Offline



External TDM No	External Facility	Others Facility	External MRN	Patient Name	Receive Date/Time	Status	Online
EXTDM00000840	Hospital Segamat		HPSF150459			Resulted	NO
EXTDM00000788	Hospital Pakar Sultanah Fatimah, Muar		HPSF150165			Resulted	NO
EXTDM00000830	Hospital Segamat		HPSF152001			Resulted	NO
EXTDM00000386	Hospital Pakar Sultanah Fatimah, Muar		HPSF 151046			Resulted	NO

Figure 3.4.2-1 External TDM Listing Page

External TDM module is for user to record external TDM resulting (Outsource) via online and offline. It is recorded offline if one of the facility used PhIS to perform TDM processes.

STEP 1

Click on 'Pharmacy Transaction' menu follow by 'Clinical' sub-menu

STEP 2

Click on 'TDM' and click on 'External TDM' function

STEP 3

Click on the **Register Patient** button to register external patient

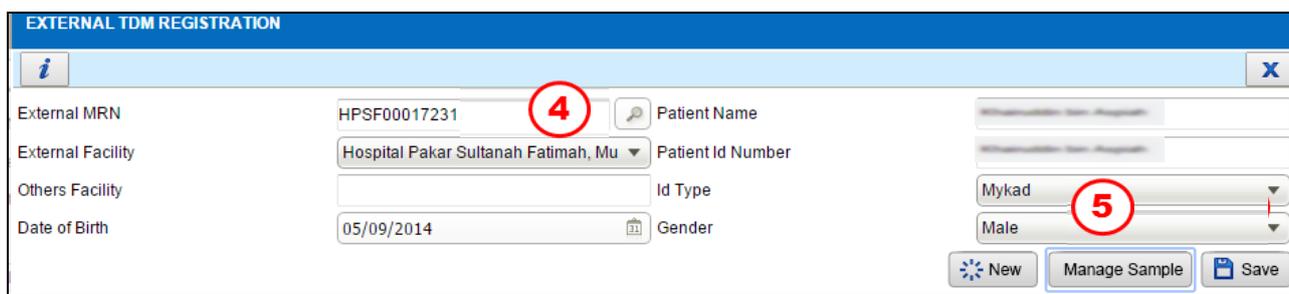


Figure 3.4.2-2 External TDM Registration

STEP 4

Enter details in the fields below:

- External MRN
- Patient Name
- External Facility
- Patient Id Number
- Other Facility
(If the sample come from private sector or facility which is not listed under MOH facilities)
- Id Type

Note

Click on the External MRN  button to search for registered patient and all fields will be automatically retrieved.

STEP 5

Click on the **Manage Sample** button and External TDM Resulting screen will be displayed as per Figure 3.4.2-3

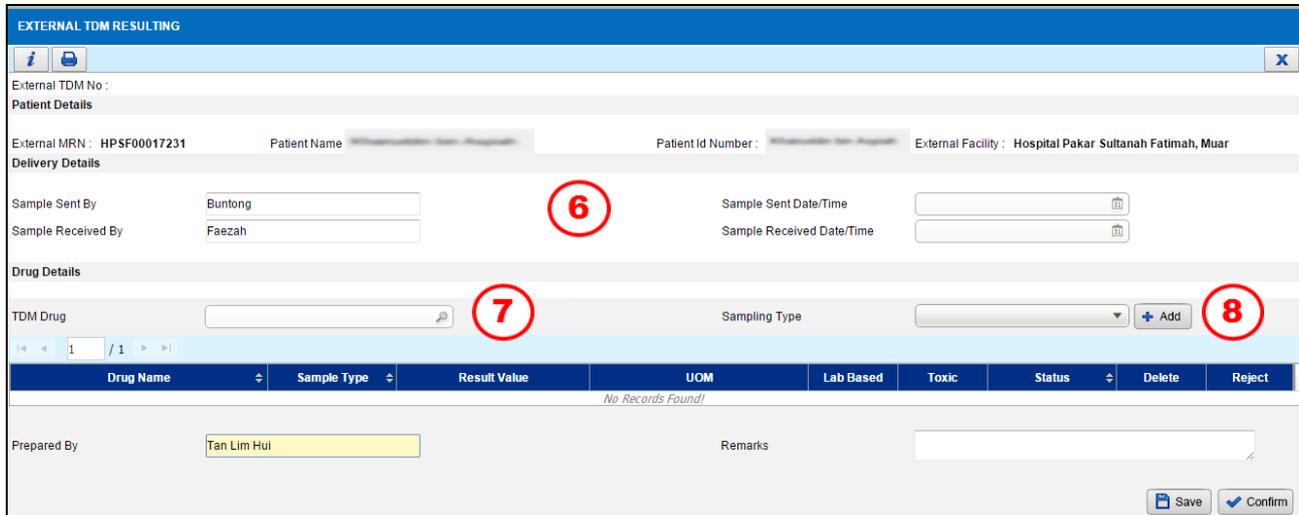


Figure 3.4.2-3 External TDM Resulting

STEP 6

Enter **Delivery Details** as below:

- Sample Sent By
- Sample Sent Date/Time
- Sample Received By
- Sample Received Date/Time

STEP 7

Click on the **TDM Drug**  button to search for drug

STEP 8

Select **Sampling Type** from dropdown box:

- Pre
- Post
- Random

and click on the **+ Add** button to add the information

EXTERNAL TDM RESULTING

External TDM No :

Patient Details

External MRN : HPSF00017231 Patient Name : Patient Id Num : External Facility : Hospital Pakar Sultanah Fatimah, Muar

Delivery Details

Sample Sent By : Sample Sent Date/Time :

Sample Received By : Sample Received Date/Time :

Drug Details

TDM Drug : Sampling Type : + Add

Drug Name	Sample Type	Result Value	UOM	Lab Based	Toxic	Status	Delete	Reject
Theophylline 250 mg Long Acting Tablet	PRE	100	mg/dL	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

Prepared By : Remarks :

9
10
11

Figure 3.4.2-4 External TDM Resulting

STEP 9

Enter **Result Value** and select **UOM** from dropdown box:

- mcg/ml
- mg/dl/ml

Note

- Select on **Lab Based** checkbox if TDM resulting process is done at a laboratory.
- Select on **Toxic** checkbox if TDM results show toxicity for selected patient.
- Select on **Reject** checkbox to reject sampling received.
- Select on **Delete** checkbox to delete TDM order.
- Enter **Remarks** if applicable.

STEP 10

Click on the  button to save external TDM resulting

STEP 11

Click on the  button to confirm external TDM resulting

4.0 Acronyms

Abbreviation	Definition
PhIS	Pharmacy Information System
CPS	Clinical Pharmacy System
MOH	Ministry Of Health
TDM	Therapeutic Drug Monitoring

5.0 Links to Clinical Modules

No	Module	PDF Links	No	Module	PDF Links
1	Inpatient	Click Here	12	CDR Dispensing	Click Here
2	CDR Order	Click Here	13	Methadone Dispensing	Click Here
3	TDM Order	Click Here	14	PN Dispensing	Click Here
4	PN Order	Click Here	15	Order Management	Click Here
5	IV Order	Click Here	16	Patient Management	Click Here
6	Prepacking	Click Here	17	Radiopharmaceuticals	Click Here
7	Galenical	Click Here	18	Outpatient	Click Here
8	MTAC	Click Here	19	Special Drug Request	Click Here
9	ADR & DAC	Click Here	20	MAR	Click Here
10	Medication Counselling	Click Here	21	DICE	Click Here
11	Ward Pharmacy	Click Here	22		