

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

Full Based User Manual TDM Calculator

Version	: 7th Edition
Document ID	: FB_U. MANUAL_TDM CALCULATOR



© 2011-2018 Pharmacy Information System & Clinic Pharmacy System (PhIS & CPS) Project

CONFIDENTIAL COPYRIGHTED MATERIAL – The information includes all concepts, comments, recommendations, and material, contained herein shall remain the property of Pharmacy Information System & Clinic Pharmacy System (PhIS & CPS) Project. No portion of this document shall be disclosed, duplicated or used in whole or in part of any purpose other than the purpose of the Pharmacy Information System & Clinic Pharmacy System (PhIS & CPS) Project execution only.

Reference ID : FB_U. MANUAL_TDM CALCULATOR-7th Edition

Application reference: PhIS & CPS v1.7.1

Table of Contents

1.0 Introduction.....	1
1.1 Overview of PhIS	1
1.2 Purpose and Objectives	1
1.3 Organized Sections.....	1
2.0 Application Standard Features.....	2
2.1 PhIS Legend.....	2
2.2 Latest Enhancement and Updates	4
3.0 Calculator for Vancomycin	5
4.0 Calculator for Gentamicin / Amikacin	8
5.0 Calculator for Valproic Acid.....	11
6.0 Calculator for Aminophylline / Theophylline	13
7.0 Calculator for Carbamazepine	15
8.0 Calculator for Digoxin.....	17
9.0 Calculator for Phenobarbitone	19
10.0 Calculator for Phenytoin.....	21
11.0 Acronyms.....	23
12.0 Links To Clinical Modules	23

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 TDM Calculator module and its key features and functionalities. The primary objective is to guide user through the process of completing PhIS application process.

User will understand the following activities in details:

- Calculator for Vancomycin
- Calculator for Gentamicin
- Calculator for Valproic Acid

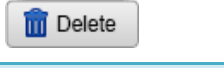
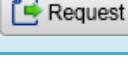
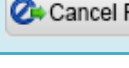
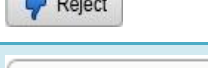
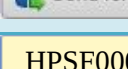
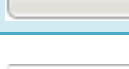
1.3 Organized Sections

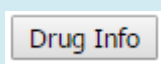
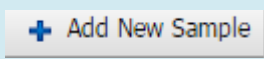
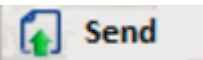
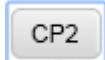
These are the sections within this document:

- Section 1: Introduction
- Section 2: Application Standard Features
- Section 3: Calculator for Vancomycin
- Section 4: Calculator for Gentamicin
- Section 5: Calculator for Valproic Acid
- Section 6: Acronyms
- Section 7: Links to Clinical Modules

2.0 Application Standard Features

2.1 PhIS Legend

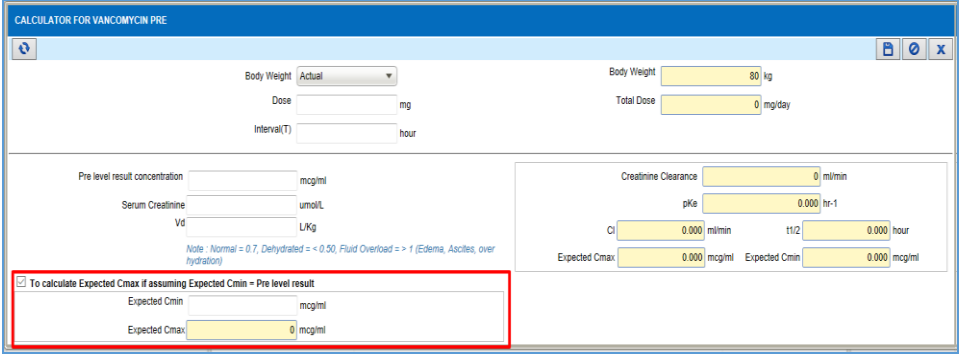
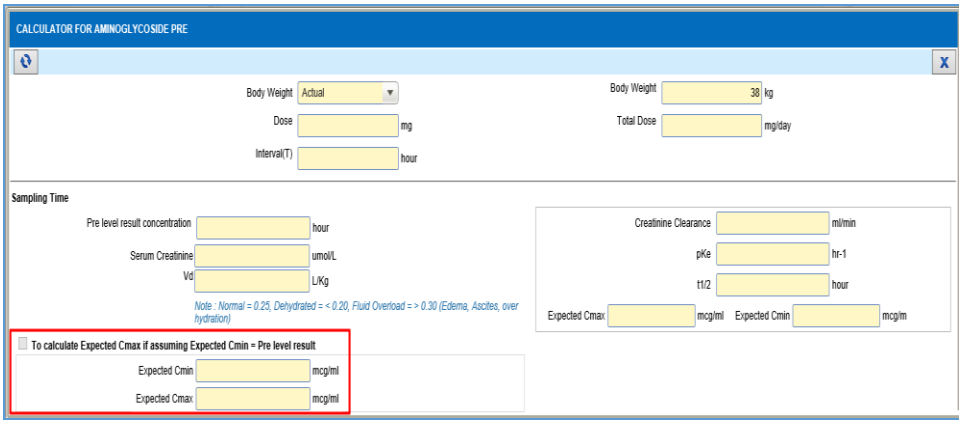
Standard Legend			
	Login to PhIS		Logout from PhIS
	Change Login Password		Reset Login Screen
	Expand Menu		Collapse Menu
	Display Home Tab		Expand Module
	Collapse Module		Close All Open Tabs
	Refresh Screen		Search Record
	Add/Create New Record		Show Help
	Print		Mandatory Field
	Calendar Icon		Search Icon
	Close Window		Radio Button
	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
	Send for Approval		Dropdown Box
	Automatically Display/Retrieve Box		Empty Text Box

Therapeutic Drug Monitoring Module Legend			
	To Acknowledge		Drug Info
	To Do New Order		To Verify
	Cancel the Order		To Add New Sample
	To send request		Ward Pharmacy

Note

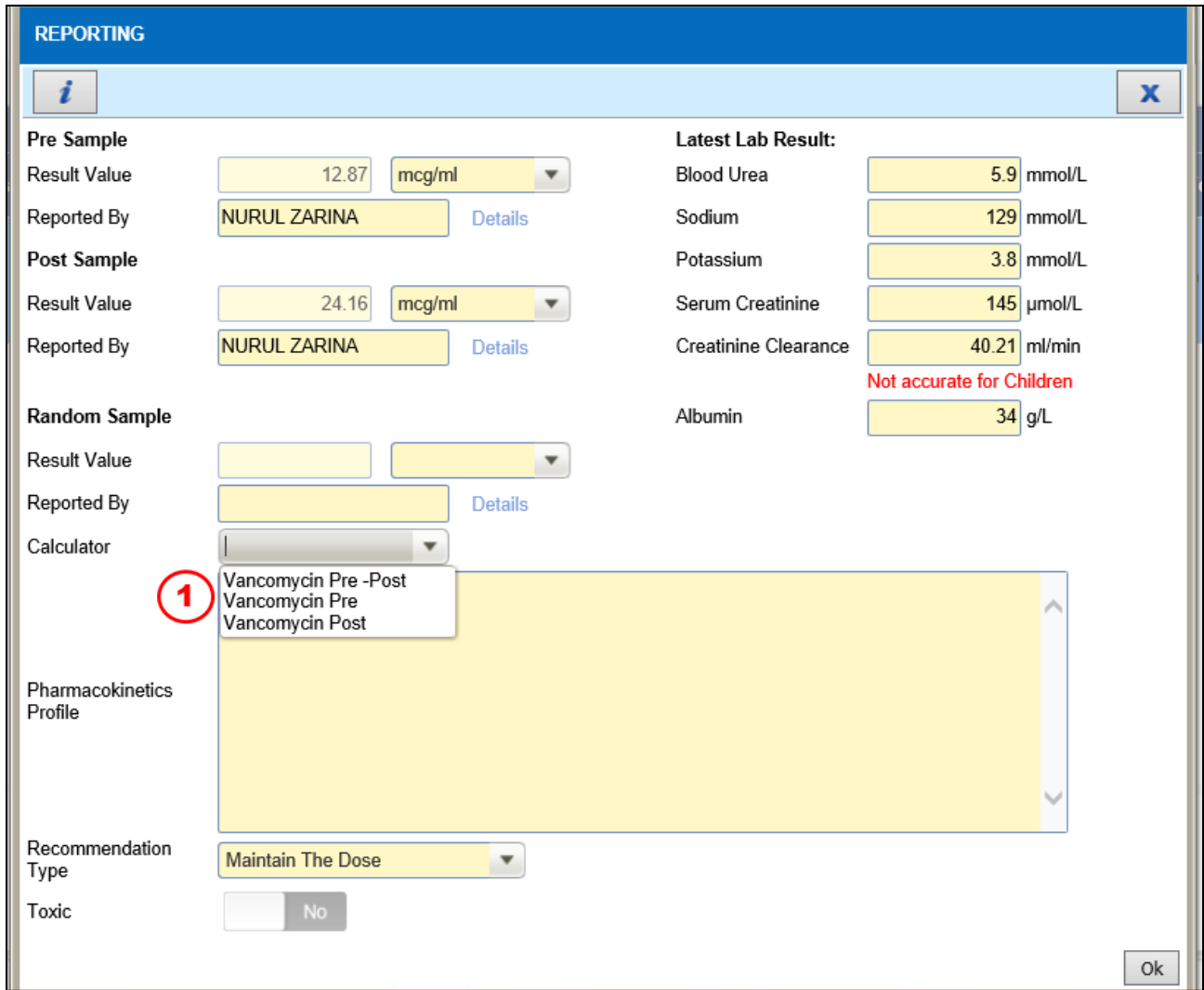
To learn more about Login Information, kindly click [Login Information](#) module for descriptive steps.

2.2 Latest Enhancement and Updates

Latest Functions	Page
TDM Calculator for: New Calculator for Vancomycin (PRE only)  - Added check box to activate the calculator. - Added Expected Cmin - Free text field - Added Expected Cmax – Formula: $= \text{Expected Cmin} / (\text{EXP}(-p\text{Ke} * \text{Interval}(T)))$	6
New Calculator for Aminoglycoside Pre  - Added check box to activate the calculator. - Added Expected Cmin - Free text field - Added Expected Cmax – Formula: $= \text{Expected Cmin} / (\text{EXP}(-p\text{Ke} * \text{Interval}(T)))$	10

3.0 Calculator for Vancomycin

To view the calculator in the system, perform the steps below:



REPORTING

Pre Sample
 Result Value: 12.87 mcg/ml
 Reported By: NURUL ZARINA Details

Post Sample
 Result Value: 24.16 mcg/ml
 Reported By: NURUL ZARINA Details

Random Sample
 Result Value:
 Reported By: Details
 Calculator:
 1 Vancomycin Pre -Post
 Vancomycin Pre
 Vancomycin Post

Latest Lab Result:
 Blood Urea: 5.9 mmol/L
 Sodium: 129 mmol/L
 Potassium: 3.8 mmol/L
 Serum Creatinine: 145 µmol/L
 Creatinine Clearance: 40.21 ml/min
 Not accurate for Children
 Albumin: 34 g/L

Pharmacokinetics Profile

Recommendation Type
 Maintain The Dose

Toxic
 No

Ok

Figure 3.0-1 Pre Calculator for Vancomycin Detail

STEP 1

Select calculator from dropdown box example:

- Vancomycin in Pre
- Vancomycin in Post
- Vancomycin in Pre-Post

Note

- Choose the calculator and fill the result in the box as per Figure 3.0-1. Sample Details consists of:
 - Calculator for **Vancomycin Pre**
 - a. Dose medication in mg
 - b. Interval Time
 - c. Pre level result concentration
 - d. Serum Creatinine
 - e. Vd
 - f. Expected Cmax if assuming Expected Cmin = Pre level result

➤ Calculator for **Vancomycin Post**

- Dose medication in mg
- Interval Time
- Sampling Time: Duration between time after complete infusion and post sampling(t)
- Serum level: Post level result concentration, Serum Creatinine
- New dose and Cmin based on desired Cmax
- Expected Cmin and Cmax based on new suggested dose

➤ Calculator for **Vancomycin Pre & Post**

- Dose medication in mg
- Interval Time
- Sampling Time: Duration between time after complete infusion and post sampling(t) and Duration between completion time of pre and post sampling (t2-t1)
- Serum level: Pre level result concentration, Post level result concentration and Serum Creatinine
- Vd, Ke and t1/2
- Area Under Curve (AUC) Over 24hrs
- New dose and Cmin based on desired Cmax
- Expected Cmin and Cmax if Vd varies
- Expected Cmin and Cmax based on new suggested dose

- After save the calculator, the result will appear at the Pharmacokinetics Profile box
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 3.0-1

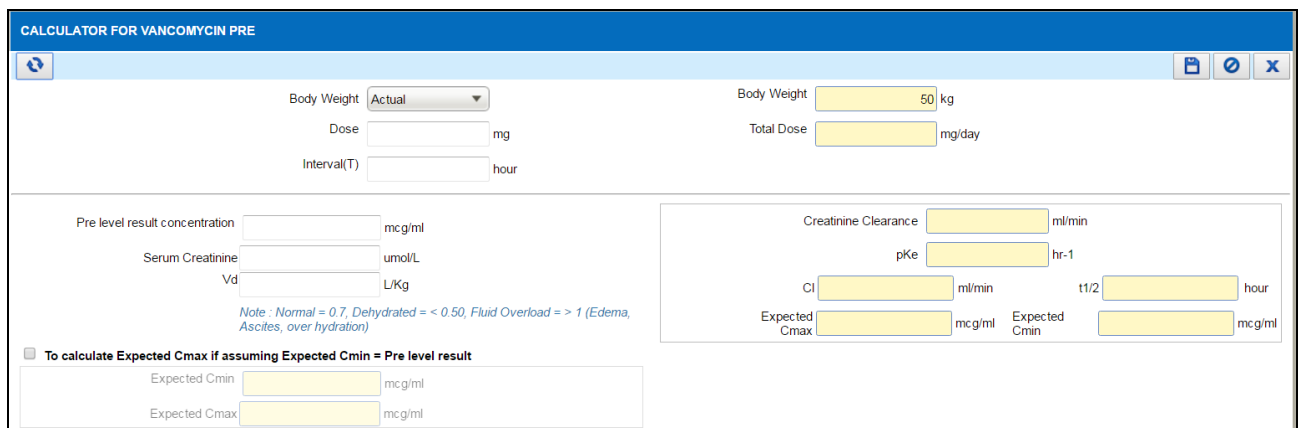


Figure 3.0-2 Pre Calculator for Vancomycin Detail

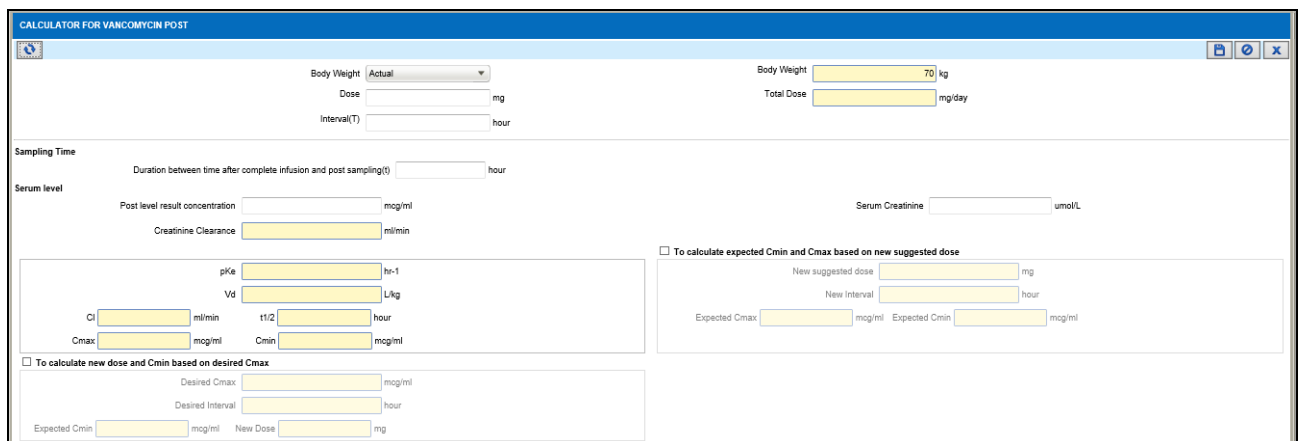


Figure 3.0-3 Post Calculator for Vancomycin Detail

CALCULATOR FOR VANCOMYCIN PRE & POST

Body Weight:

Dose: mg

Interval(T): hour

Body Weight: kg

Total Dose: mg/daily

Sampling Time

Duration between time after complete infusion and post sampling(t): hour

Duration between completion time of pre and post sampling (2-t1): hour

Serum level

Pre level result concentration: mcg/ml

Post level result concentration: mcg/ml

Serum Creatinine: umol/L

Creatinine Clearance: ml/min

☐ To calculate Vd, Ke and t1/2

Ke: hr⁻¹

Vd: L/kg

Cl: ml/min

t1/2: hour

Cmax: mcg/ml

Cmin: mcg/ml

☐ To calculate Area Under Curve (AUC) Over 24hrs

Vd: L/kg

MIC: mg/L

Note MIC < 2mg/L AUC > 400

AUC:

☐ To calculate new dose and Cmin based on desired Cmax

Desired Cmax: mcg/ml

Desired Interval: hour

Expected Cmin: mcg/ml

New Dose: mg

☐ To calculate expected Cmin and Cmax if Vd varies

Vd: L/kg

Expected Cmax: mcg/ml

Expected Cmin: mcg/ml

☐ To calculate expected Cmin and Cmax based on new suggested dose

New suggested dose: mg

Every Hour: hour

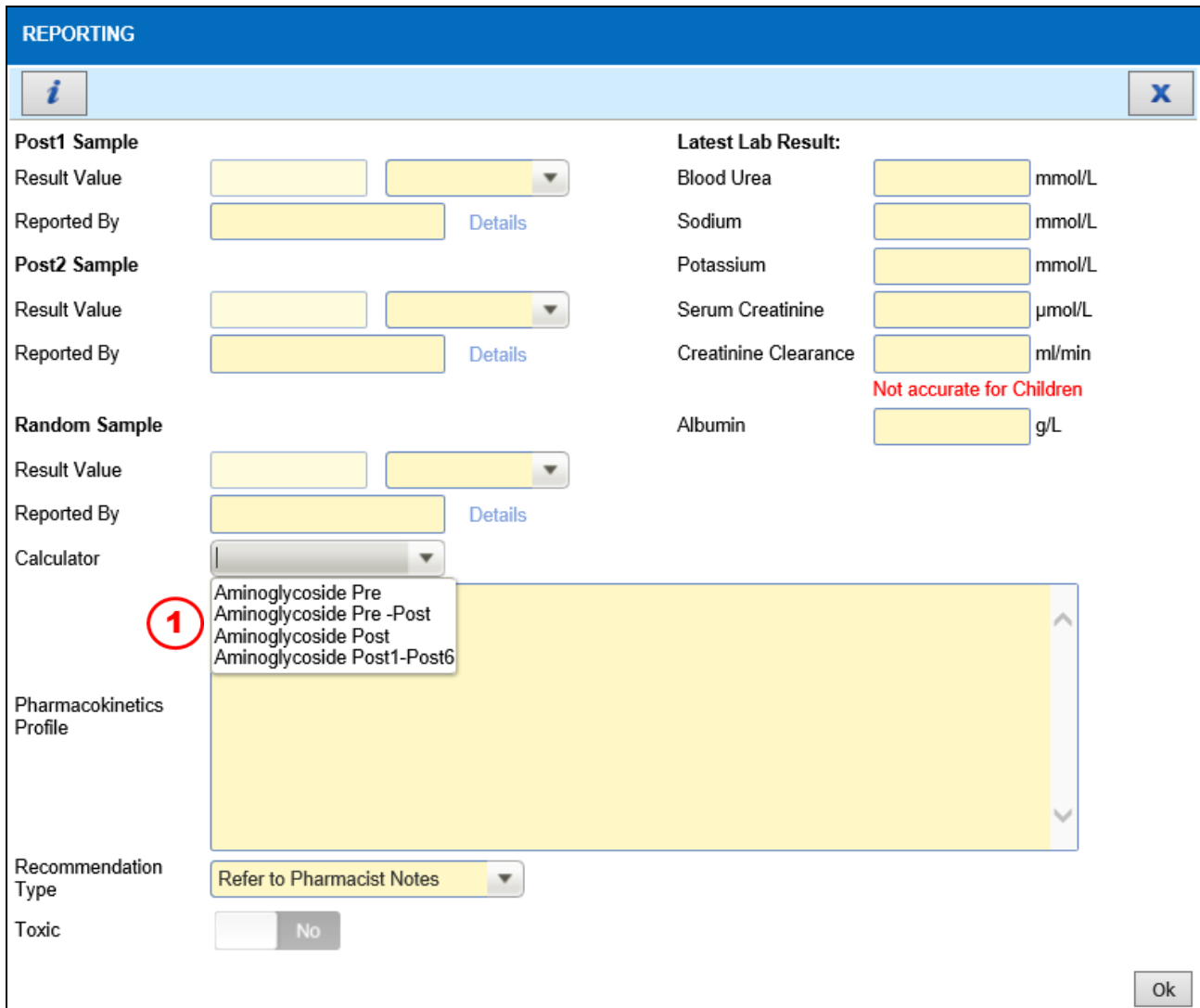
Expected Cmax: mcg/ml

Expected Cmin: mcg/ml

Figure 3.0-4 Pre & Post Calculator for Vancomycin Detail

4.0 Calculator for Gentamicin / Amikacin

To view the calculator in the system, perform the steps below:



REPORTING

Post1 Sample

Result Value

Reported By Details

Post2 Sample

Result Value

Reported By Details

Random Sample

Result Value

Reported By Details

Calculator

Pharmacokinetics Profile

Recommendation Type

Toxic No

Latest Lab Result:

Blood Urea mmol/L

Sodium mmol/L

Potassium mmol/L

Serum Creatinine µmol/L

Creatinine Clearance ml/min

Albumin g/L

Not accurate for Children

Ok

Figure 4.0-1 Calculator for Gentamicin / Amikacin

STEP 1

Select calculator from dropdown box example:

- Aminoglycoside Pre-Post
- Aminoglycoside Pre
- Aminoglycoside Post
- Aminoglycoside Post 1- Post 6

Note

- Choose the calculator and fill the result in the box as per Figure 4.0-1. Sample Details consists of:
 - Calculator for **Aminoglycoside Pre**
 - a. Dose medication in mg
 - b. Interval Time
 - c. Pre level result concentration
 - d. Serum Creatinine
 - e. Vd
 - f. Expected Cmax if assuming Expected Cmin = Pre level result

➤ Calculator for **Aminoglycoside Post**

- Dose medication in mg
- Interval Time
- Sampling Time: Duration between time after complete infusion and post sampling(t)
- Serum level: Post level result concentration, Serum Creatinine
- Vd, Ke and t1/2
- New dose and Cmin based on desired Cmax
- Expected Cmin and Cmax based on new suggested dose

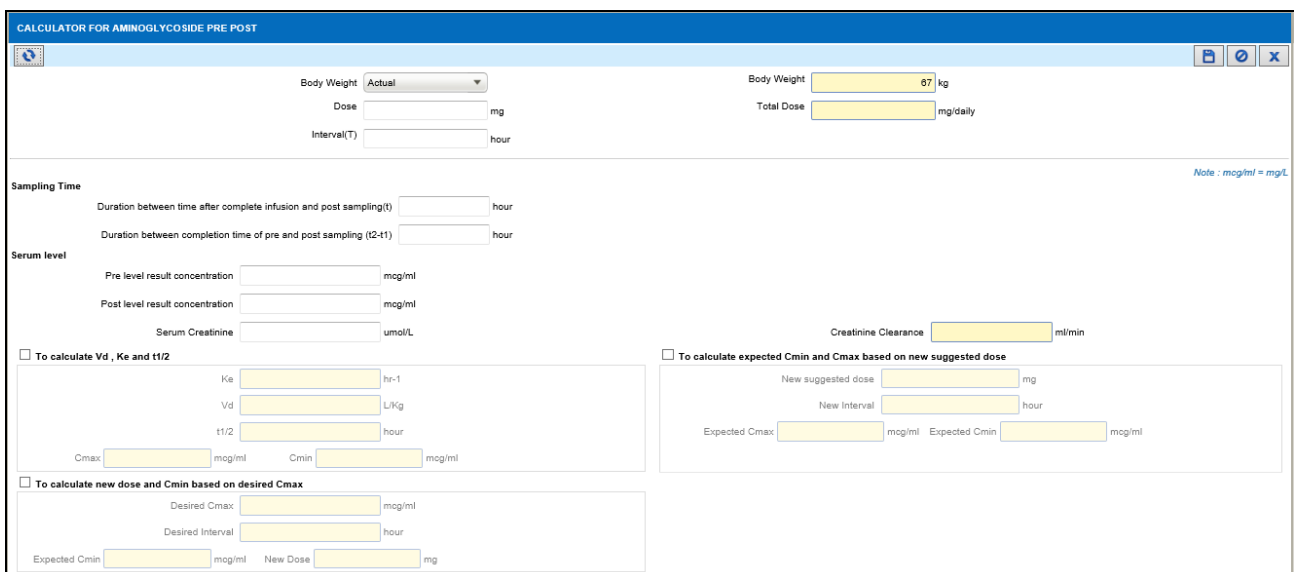
➤ Calculator for **Aminoglycoside Pre & Post**

- Dose medication in mg
- Interval Time
- Sampling Time: Duration between time after complete infusion and post sampling(t) and Duration between completion time of pre and post sampling (t2-t1)
- Serum level: Pre level result concentration, Post level result concentration and Serum Creatinine
- Vd, Ke and t1/2
- New dose and Cmin based on desired Cmax
- Expected Cmin and Cmax based on new suggested dose

➤ Calculator for **Aminoglycoside Post 1 & Post 6**

- Dose medication in mg
- Interval Time
- Sampling Time: Duration between time after complete infusion and post 1 sampling(t) and Duration between completion time of post6 and post1 sampling (t6-t1)
- Serum level: Post 1 level result concentration, Post 6 level result concentration and Serum Creatinine
- Vd, Ke and t1/2
- New dose and Cmin based on desired Cmax
- Expected Cmin and Cmax based on new suggested dose

- After save the calculator, the result will appear at the Pharmacokinetics Profile box
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 4.0-1



CALCULATOR FOR AMINOGLYCOSIDE PRE POST

Body Weight: kg
 Dose: mg
 Interval(T): hour
 Total Dose: mg/daily

Sampling Time
 Duration between time after complete infusion and post sampling(t): hour
 Duration between completion time of pre and post sampling (t2-t1): hour

Serum level
 Pre level result concentration: mg/ml
 Post level result concentration: mg/ml
 Serum Creatinine: umol/L
 Creatinine Clearance: ml/min

☐ To calculate Vd, Ke and t1/2
 Ke: hr⁻¹
 Vd: L/kg
 t1/2: hour
 Cmax: mg/ml
 Cmin: mg/ml

☐ To calculate expected Cmin and Cmax based on new suggested dose
 New suggested dose: mg
 New Interval: hour
 Expected Cmax: mg/ml
 Expected Cmin: mg/ml

☐ To calculate new dose and Cmin based on desired Cmax
 Desired Cmax: mg/ml
 Desired Interval: hour
 Expected Cmin: mg/ml
 New Dose: mg

Note : mg/ml = mg/L

Figure 4.0-2 Calculator for Aminoglycoside Pre-Post Detail

CALCULATOR FOR AMINOGLYCOSIDE PRE

Body Weight Actual 60 kg
Dose mg
Interval(T) hour
Total Dose mg/day

Sampling Time
Pre level result concentration hour
Serum Creatinine umol/L
Vd L/Kg
Note : Normal = 0.25, Dehydrated = < 0.20, Fluid Overload = > 0.30 (Edema, Ascites, over hydration)

Creatinine Clearance ml/min
pKe hr-1
t1/2 hour
Expected Cmax mcg/ml Expected Cmin mcg/ml

☐ To calculate Expected Cmax if assuming Expected Cmin = Pre level result
Expected Cmin mcg/ml
Expected Cmax mcg/ml

Figure 4.0-3 Calculator for Aminoglycoside Pre Detail

CALCULATOR FOR AMINOGLYCOSIDE POST

Body Weight Actual 67 kg
Dose mg
Interval(T) hour
Total Dose mg/daily

Sampling Time
Duration between time after complete infusion and post sampling(t) hour
Note : mcg/ml = mg/L

Serum level
Post level result concentration mcg/ml
Creatinine Clearance ml/min
Serum Creatinine umol/L

☐ To calculate Vd, Ke and t1/2
Vd L/Kg
pKe hr-1
t1/2 hour
Cmax mcg/ml Cmin mcg/ml

☐ To calculate expected Cmin and Cmax based on new suggested dose
New suggested dose mg
New Interval hour
Expected Cmax mcg/ml Expected Cmin mcg/ml

☐ To calculate new dose and Cmin based on desired Cmax
Desired Cmax mcg/ml
Desired Interval hour
Expected Cmin mcg/ml New Dose mg

Figure 4.0-4 Calculator for Aminoglycoside Post Detail

CALCULATOR FOR AMINOGLYCOSIDE POST1 & POST6

Body Weight Actual 67 kg
Dose mg
Interval(T) hour
Total Dose mg/daily

Sampling Time
Duration between time after complete infusion and post1 sampling(t) hour
Duration between completion time of post6 and post1 sampling (t6-t1) hour
Note : mcg/ml = mg/L

Serum level
Post 1 level result concentration mcg/ml
Post 6 level result concentration mcg/ml
Serum Creatinine umol/L
Creatinine Clearance ml/min

☐ To calculate Vd, Ke and t1/2
Ke hr-1
Vd L/Kg
t1/2 hour
Cmax mcg/ml Cmin mcg/ml

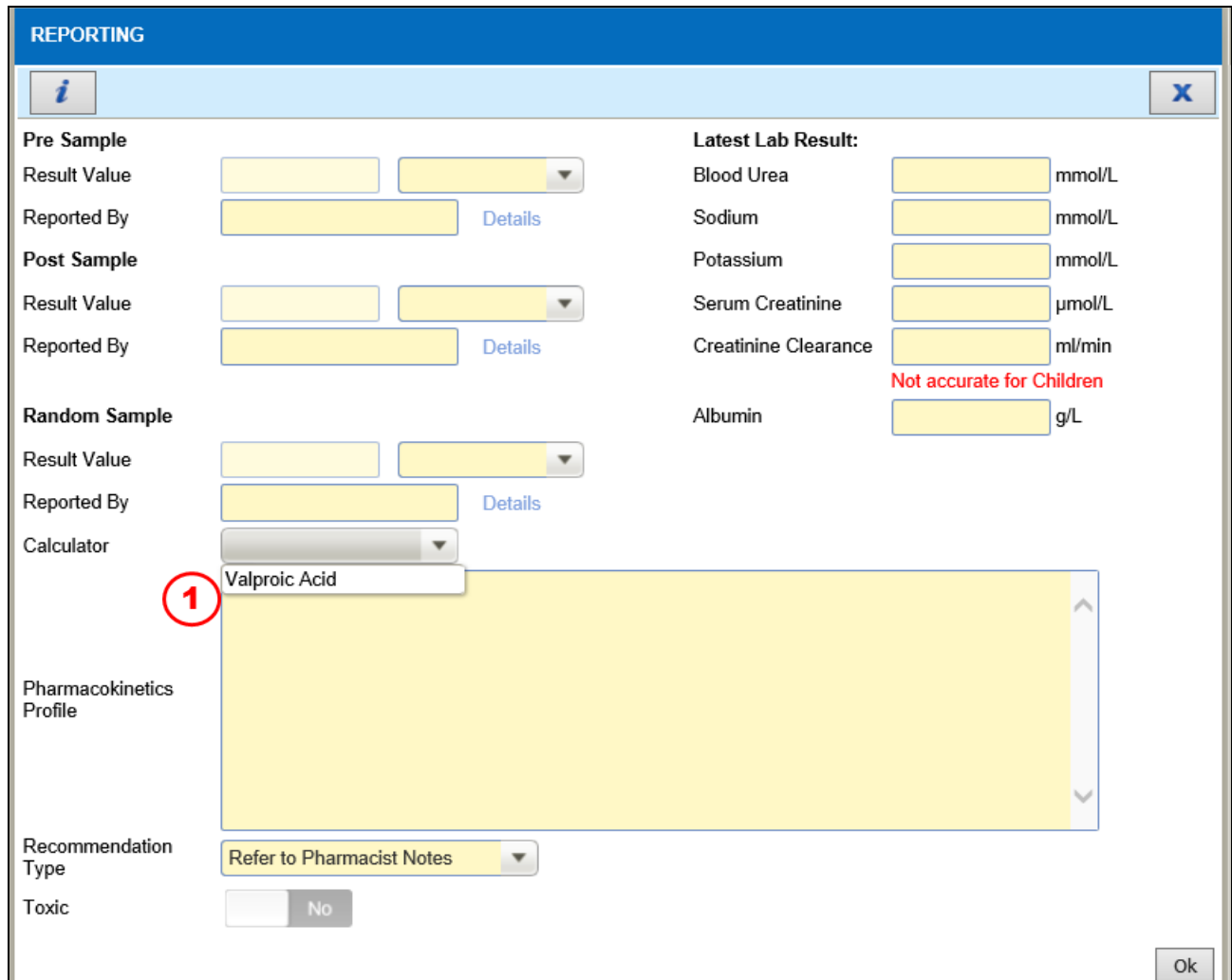
☐ To calculate expected Cmin and Cmax based on new suggested dose
New suggested dose mg
New Interval hour
Expected Cmax mcg/ml Expected Cmin mcg/ml

☐ To calculate new dose and Cmin based on desired Cmax
Desired Cmax mcg/ml
Desired Interval hour
Expected Cmin mcg/ml New Dose mg

Figure 4.0-5 Calculator for Aminoglycoside Pre 1-Post 6 Detail

5.0 Calculator for Valproic Acid

To view the calculator in the system, perform the steps below:



REPORTING

Pre Sample

Result Value

Reported By Details

Post Sample

Result Value

Reported By Details

Random Sample

Result Value

Reported By Details

Calculator Valproic Acid

Latest Lab Result:

Blood Urea mmol/L

Sodium mmol/L

Potassium mmol/L

Serum Creatinine µmol/L

Creatinine Clearance ml/min
Not accurate for Children

Albumin g/L

Pharmacokinetics Profile

Recommendation Type Refer to Pharmacist Notes

Toxic ☐ No

Ok

Figure 5.0-1 Calculator for Valproic Acid

STEP 1

Select calculator from dropdown box example:

- Valproic Acid

Note

- Choose the calculator and fill the result in the box as per Figure 5.0-1. Sample Details consists of:
 - **Valproic Acid** calculator
 - Dose medication in mg
 - Interval (T) in Hours
 - Total Dose in mg/day
 - Choose between monotherapy or polytherapy
 - ✓ **Monotherapy**- single or combination therapies of different enzyme activities
 - ✓ **Polytherapy** - combination therapies of similar enzyme activities
 - Cp Measured in mcg/ml
 - Constant Cl in mg/kg/hr
 - Vd , Ke and t1/2 based on Cl
 - New Maintenance Dose (NMD) based on I, Cp measured and Cp desired
 - Cpss level based on current dose and Cl

- Expected C_p based on Cl and New Suggested Dose (NSD)
- After save the calculator, the result will appear at the Pharmacokinetics Profile box
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 5.0-1

CALCULATOR FOR VALPROIC ACID

Body Weight: Actual 44 kg

Dose: mg

Interval(T): hour

Total Dose: mg/day

Select Calculator :

☐ Monotherapy ☒ Polytherapy

Note: single or combination therapies of different enzyme activities.

☐ To calculate V_d , K_e and $t_{1/2}$ based on Cl

C_p measured: mg/ml

Note: $mg/ml = mg/L$

Clearance CP measured: L/day

K_e : L/hr

Cl : L/hr

Constant V_d : L/kg

Note: $0.1 - 0.5 L/kg$

V_d : L/kg

K_e : hr⁻¹

$t_{1/2}$: hour

☐ To calculate New Maintenance Dose (NMD) based on Cl , C_p measured and C_p desired

C_p desired: mg/ml

Note: $mg/ml = mg/L$

Cl : L/day

New Dose: mg/day

☐ To calculate C_{pss} level based on current dose and Cl

Constant Cl : ml/kg/hr

Note: Adult=8 ml/kg/hr Children (< 12years 11month) = 13 ml/kg/hr

Clearance (Population): L/day

K_e : L/hr

Cl : L/hr

C_{pss} : mg/ml

Note: $mg/ml = mg/L$

☐ To calculate Expected C_p based on Cl and New Suggested Dose(NSD)

Cl : L/day

NSD: mg/day

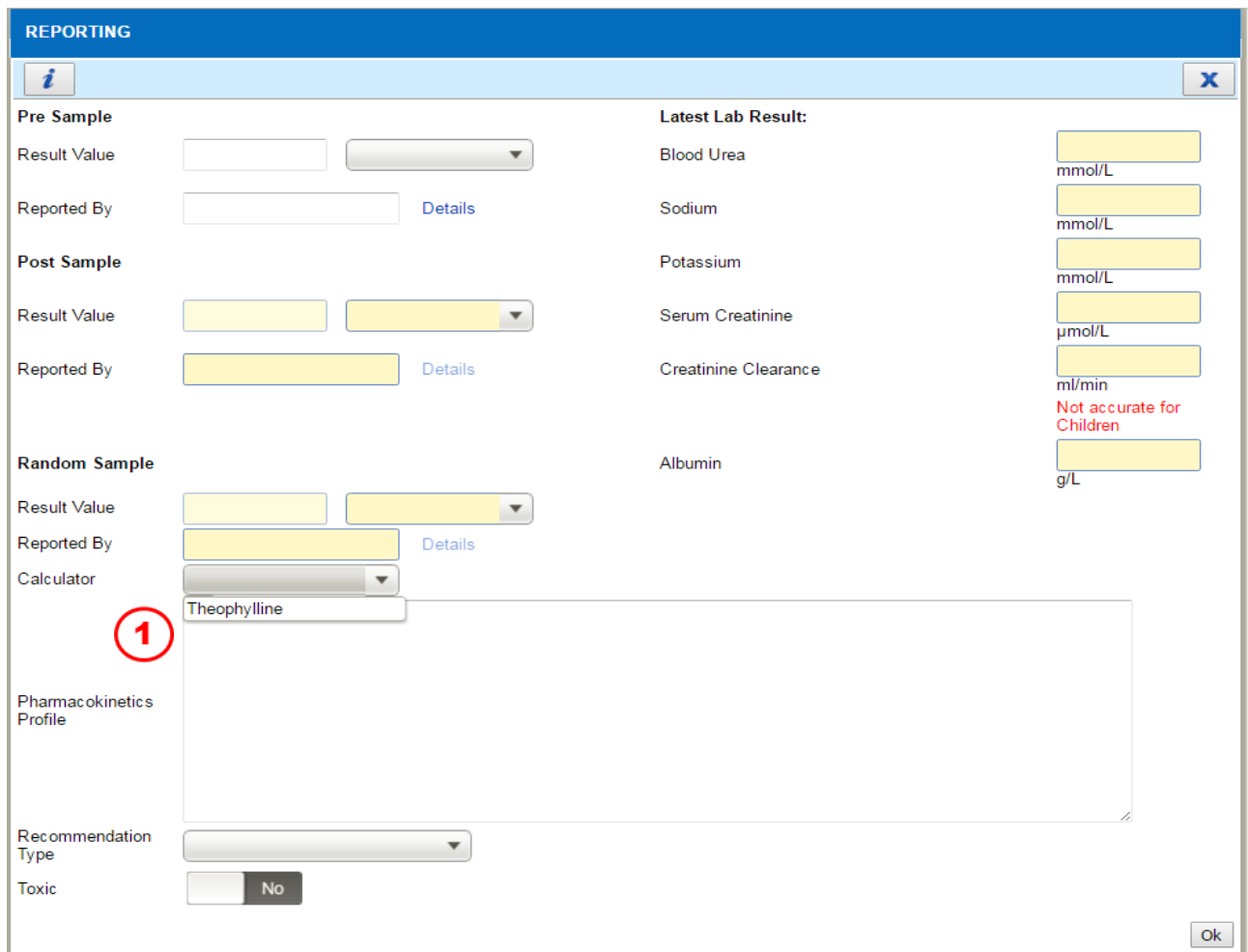
Expected C_p : mg/ml

Note: $mg/ml = mg/L$

Figure 5.0-2 Calculator for Valproic Acid Detail

6.0 Calculator for Aminophylline / Theophylline

To view the calculator in the system, perform the steps below:



REPORTING

Pre Sample

Result Value

Reported By [Details](#)

Post Sample

Result Value

Reported By [Details](#)

Random Sample

Result Value

Reported By [Details](#)

Calculator **Theophylline**

Pharmacokinetics Profile

Recommendation Type

Toxic ☐ No

Latest Lab Result:

Blood Urea mmol/L

Sodium mmol/L

Potassium mmol/L

Serum Creatinine µmol/L

Creatinine Clearance ml/min
Not accurate for Children

Albumin g/L

1

Ok

Figure 6.0-1 Calculator for Aminophylline / Theophylline

STEP 1

Select calculator from dropdown box example:

- Aminophylline / Theophylline

Note

- Choose the calculator and fill the result in the box as per Figure 6.0-1. Sample Details consists of:

➤ **Theophylline** calculator

- Choose between oral or iv

Oral

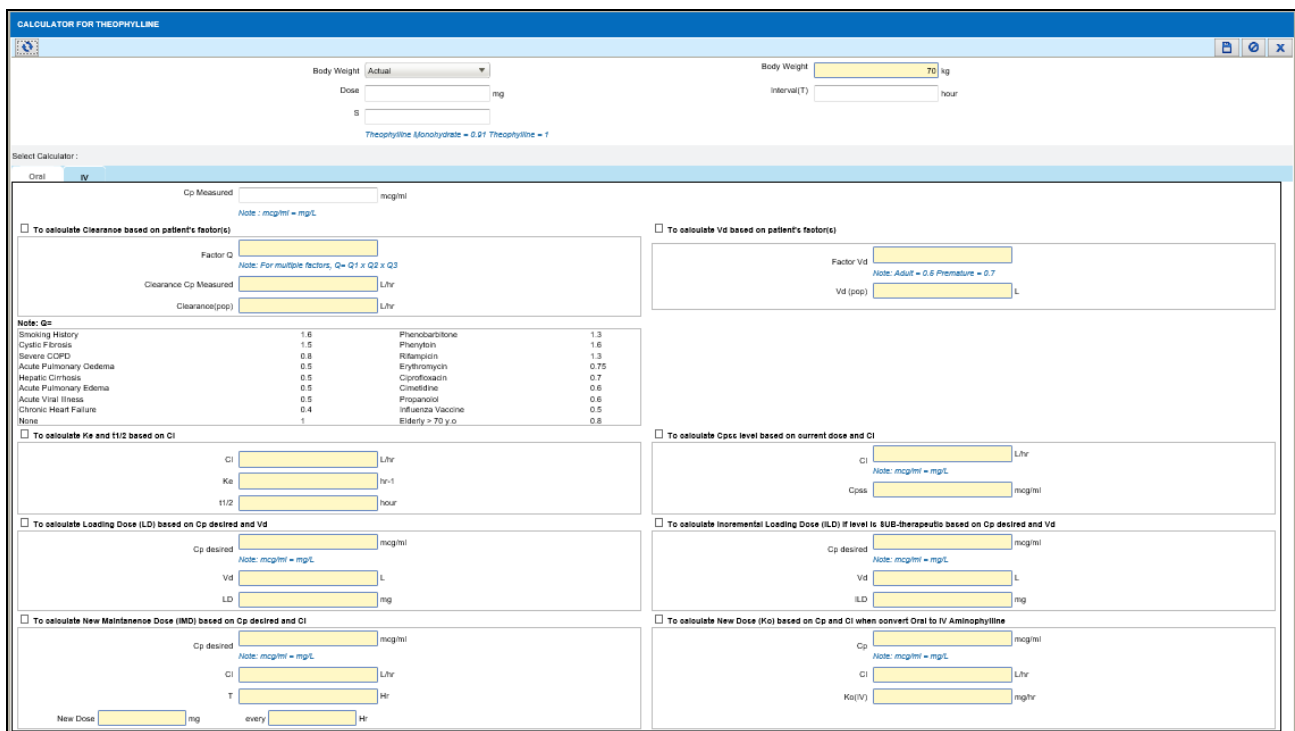
- Dose medication in mg/hr
- Cp measured in mcg/ml
- Clearance based on patient's factor(s)
- Ke and t_{1/2} based on Cl
- Loading Dose (LD) if NO Theophylline given within 24 hours
- Loading Dose (LD) if NO Theophylline given within 24 hours
- Withhold Therapy Period (T) if level is SUPRA-therapeutic based on Cp desired and Ke
- IV Aminophylline to Oral
- Cpss level based on current dose and Cl

- j. Loading Dose (LD) if Theophylline given within 24 hours
- k. Incremental Loading Dose (ILD) if level is SUB-therapeutic based on C_p desired and V_d
- l. Infusion rate (K_0) based on C_p desired and CI

Intravenous (iv)

- a. Dose medication in mg
- b. Interval (T) in hours
- c. C_p measured in mcg/ml
- d. Clearance based on patient's factor(s)
- e. K_e and $t_{1/2}$ based on CI
- f. Loading Dose (LD) based on C_p desired and V_d
- g. Incremental Loading Dose (ILD) if level is SUB-therapeutic based on C_p desired and V_d
- h. New Maintenance Dose (IMD) based on C_p desired and CI
- i. C_{pss} level based on current dose and CI
- j. New Dose (K_0) based on C_p and CI when convert Oral to IV Aminophylline

- After save the calculator, the result will appear at the Pharmacokinetics Profile box.
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 6.0-1



CALCULATOR FOR THEOPHYLLINE

Body Weight: Actual kg
Dose: mg
Interval (T): hour

Theophylline (Monohydrate) = 0.91 Theophylline = 1

Select Calculator: **IV**

☐ To calculate Clearance based on patient's factor(s)
Factor Q:
Clearance C_p Measured: L/hr
Clearance (pop): L/hr

☐ To calculate V_d based on patient's factor(s)
Factor V_d :
 V_d (pop): L

Note: Q_s

Smoking History	1.6	Phenobarbital	1.3
Cystic Fibrosis	1.5	Phenytoin	1.6
Severe COPD	0.8	Rifampin	1.3
Acute Pulmonary Edema	0.5	Erythromycin	0.75
Hepatic Cirrhosis	0.5	Ciprofloxacin	0.7
Acute Pulmonary Edema	0.5	Cimetidine	0.6
Acute Viral Infection	0.5	Propranolol	0.6
Chronic Heart Failure	0.4	Influenza Vaccine	0.5
None	1	Elderly ≥ 70 y.o.	0.8

☐ To calculate K_e and $t_{1/2}$ based on CI
 CI : L/hr
 K_e : hr⁻¹
 $t_{1/2}$: hour

☐ To calculate Loading Dose (LD) based on C_p desired and V_d
 C_p desired: mcg/ml
 V_d : L
LD: mg

☐ To calculate New Maintenance Dose (IMD) based on C_p desired and CI
 C_p desired: mcg/ml
 CI : L/hr
T: hr
New Dose: mg every hr

☐ To calculate C_{pss} level based on current dose and CI
 CI : L/hr
 C_{pss} : mcg/ml

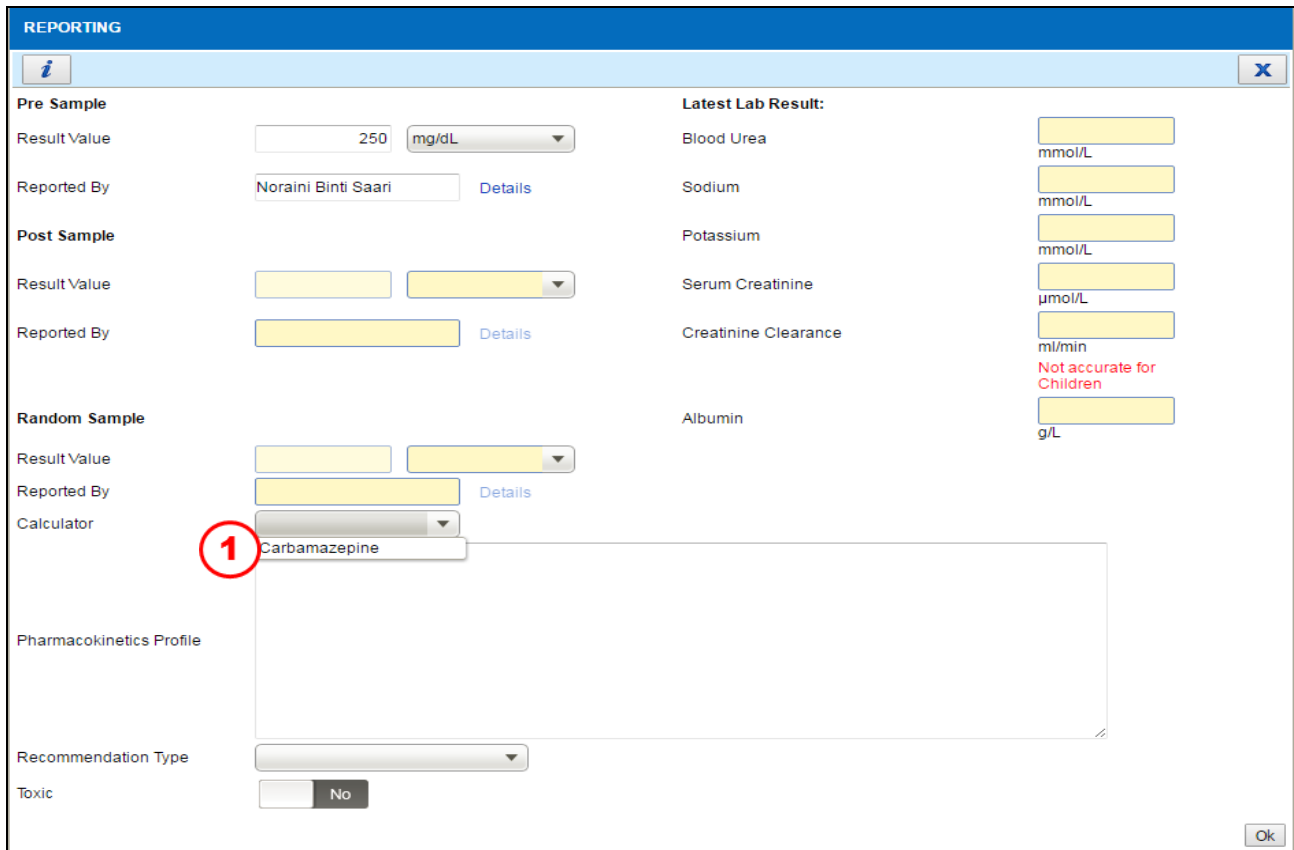
☐ To calculate Incremental Loading Dose (ILD) if level is SUB-therapeutic based on C_p desired and V_d
 C_p desired: mcg/ml
 V_d : L
ILD: mg

☐ To calculate New Dose (K_0) based on C_p and CI when convert Oral to IV Aminophylline
 C_p : mcg/ml
 CI : L/hr
 K_0 (IV): mg/hr

Figure 6.0-2 Calculator for Theophylline for Drug Aminophylline

7.0 Calculator for Carbamazepine

To view the calculator in the system, perform the steps below:



The screenshot shows a web-based reporting interface for the TDM Calculator. The main title is 'REPORTING'. Below it, there are several sections:

- Pre Sample:** Includes fields for 'Result Value' (250 mg/dL), 'Reported By' (Noraini Binti Saari), and a 'Details' link.
- Post Sample:** Includes fields for 'Result Value' and 'Reported By', both with empty input boxes and a 'Details' link.
- Random Sample:** Includes fields for 'Result Value', 'Reported By', and 'Calculator'. The 'Calculator' dropdown is highlighted with a red circle and the number '1', showing 'Carbamazepine' as the selected option.
- Latest Lab Result:** A list of lab results including Blood Urea, Sodium, Potassium, Serum Creatinine, Creatinine Clearance, and Albumin, each with an empty input box and a unit.
- Pharmacokinetics Profile:** A large empty text area for notes.
- Recommendation Type:** A dropdown menu.
- Toxic:** A toggle switch set to 'No'.

Figure 7.0-1 Calculator for Carbamazepine

STEP 1

Select calculator from dropdown box example:

- Carbamazepine

Note

- Choose the calculator and fill the result in the box as per Figure 7.0-1. Sample Details consists of:
 - **Carbamazepine** calculator
 - Dose medication in mg
 - Interval Time in Hours
 - Total Dose in mg/day
 - Choose between monotherapy or polytherapy
 - ✓ **Monotherapy**- single or combination therapies of different enzyme activities
 - ✓ **Polytherapy** - combination therapies of similar enzyme activities
 - Cp Measured in mcg/ml
 - Vd , Ke and t1/2
 - New Maintenance Dose (NMD) based on Cp measured and Cp desired
 - Cpss level based on current dose and Cl
 - Expected Cp based on New Suggested Dose

- After save the calculator, the result will appear at the Pharmacokinetics Profile box.
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 7.0-1

CALCULATOR FOR CARBAMAZEPINE

Body Weight: Actual 70 kg

Dose: mg

Interval(T): Hr

Total Dose: mg/day

Select Calculator:

☐ Monotherapy ☒ **Polytherapy**

Note: single or combination therapies of different enzyme activities.

Cp Measured: mg/ml

Note: *mcg/ml = mg/L*

Clearance CP measured: 0.000 L/day

≈ 0.000 L/hr

Clearance (Population): 107.520 L/day

≈ 4.480 L/hr

☐ To calculate Vd, Ke and t1/2

Cl: L/hr

Vd: L/hr

Ke: hr⁻¹

t1/2: hour

☐ To calculate Cpss level based on current dose and Cl

Cl: L/hr

Note: *mcg/ml = mg/L*

Cpss: mcg/ml

☐ To calculate New Maintenance Dose (NMD) based on Cp measured dan Cp desired

Cp Desired: mg/L

Note: *mcg/ml = mg/L*

Cl: L/day

New Dose: mg/day

☐ To calculate Expected Cp based on New Suggested Dose

Cl: L/day

Note: *mcg/ml = mg/L*

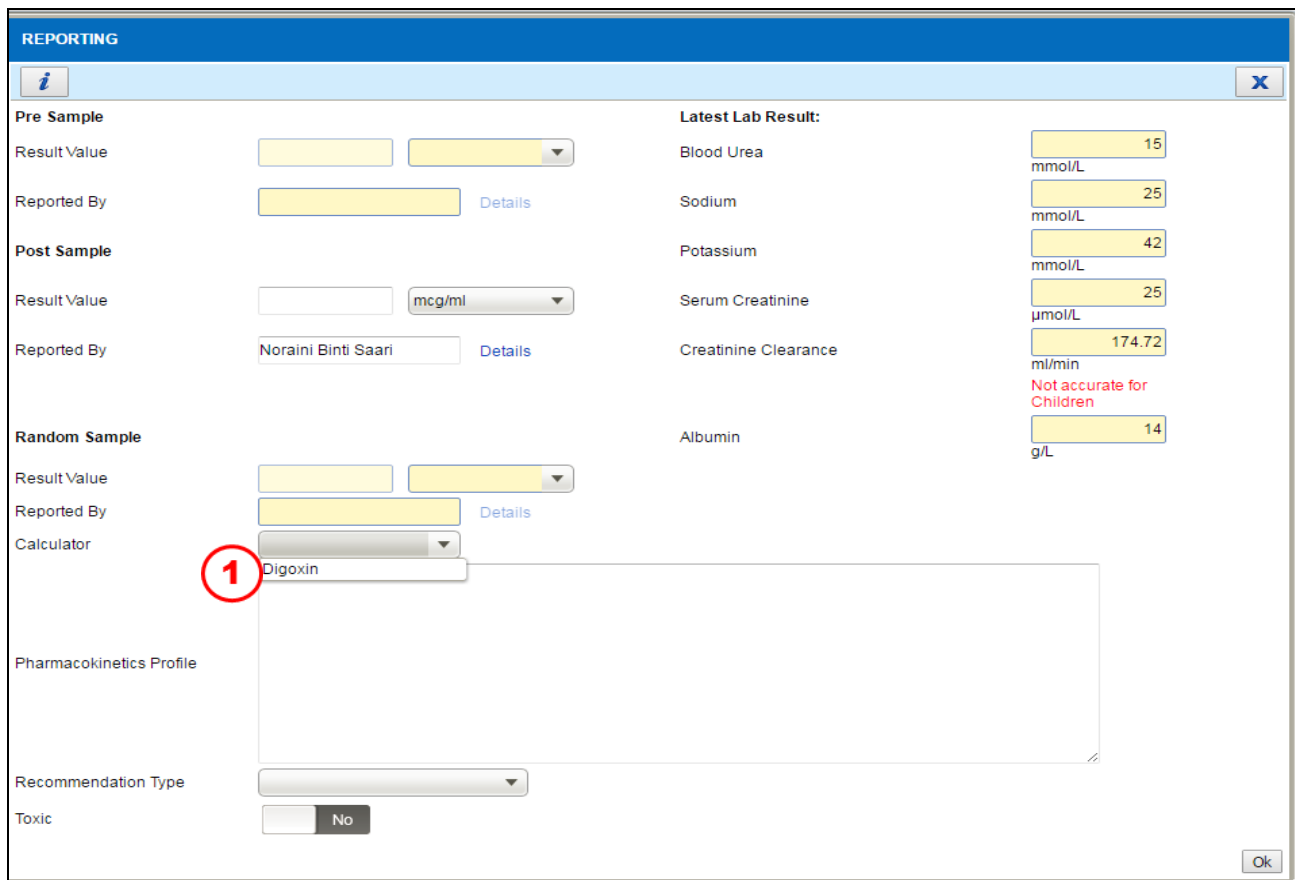
Suggested dose: mg/day

Expected Cp: mg/L

Figure 7.0-2 Calculator for Carbamazepine for Drug Carbamazepine

8.0 Calculator for Digoxin

To view the calculator in the system, perform the steps below:



REPORTING

Pre Sample

Result Value:

Reported By: Details

Post Sample

Result Value: mcg/ml

Reported By: Noraini Binti Saari Details

Random Sample

Result Value:

Reported By: Details

Calculator: Digoxin

Pharmacokinetics Profile

Recommendation Type:

Toxic: No

Latest Lab Result:

Blood Urea	15 mmol/L
Sodium	25 mmol/L
Potassium	42 mmol/L
Serum Creatinine	25 µmol/L
Creatinine Clearance	174.72 ml/min
Albumin	14 g/L

Not accurate for Children

Ok

Figure 8.0-1 Calculator for Digoxin

STEP 1

Select calculator from dropdown box example:

- Digoxin

Note

- Choose the calculator and fill the result in the box as per Figure 8.0-1. Sample Details consists of:
 - **Digoxin calculator**
 - Total Dose in mg/day
 - Serum Creatinine in umol/L
 - Choose patient condition:
 - ✓ Without CHF and not renally impaired
 - ✓ Without CHF and renally impaired
 - ✓ With CHF and not renally impaired
 - ✓ With CHF and renally impaired
 - Cp Measured in mcg/ml
 - Ke and t1/2 based on Cl
 - Vd based on Patient's Factor(s)
 - Cpss level based on current dose and Cl
 - Expected Cp based on Cl and New Suggested Dose
 - Loading Dose(LD) based on Vd and Cp desired
 - New Maintenance Dose(NMD) based on Cl and Cp desired

- After save the calculator, the result will appear at the Pharmacokinetics Profile box.
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 8.0-1

CALCULATOR FOR DIGOXIN

Body Weight: kg kg

Total Dose: mg/day

Serum Creatinine: umol/L

Creatinine Clearance: ml/min

F: Note: Tablet = 0.7; Elixir = 0.8; Soft Gelatin capsule / Injection = 1

Select Patient's Condition:

☐ Without CHF and not renally impaired ☐ Without CHF and renally impaired ☐ With CHF and not renally impaired ☐ With CHF and renally impaired

Cp measured: ng/ml

Note: mcg/ml = mg/L = 10^{-2} mcg/ml = 10^{-2} mg/L

☐ To calculate CI based on Patient's Factor(s)

Factor CI: Note: None = 1 Quinidine = 0.5 Amiodarone = 0.50 Versipam = 0.75 Clinically hypothyroid = 0.7 Clinically hyperthyroid = 1.3

Clearance CP measured: L/day

Clearance (Population): L/day

☐ To calculate Ke and t1/2 based on CI

CI: L/day

Ke: hr-1

t1/2: hour

☐ To calculate Cps level based on current dose and CI

CI: L/day

Cps: mg/L

= ng/ml

☐ To calculate Expected Cp based on CI and New Suggested Dose (NSD)

CI: L/day

New Suggested dose: mg/day

Expected Cp: mg/L = ng/ml

☐ To calculate Vd based on Patient's Factor(s)

Factor Vd: Note: None = 1 Quinidine = 0.7 Clinically hypothyroid = 0.7 Clinically hyperthyroid = 1.3

Vd (pop): L

☐ To calculate Loading Dose(LD) based on Vd and Cp desired

Cp Desired: ng/ml

LD: mg/day

☐ To calculate New Maintenance Dose(NMD) based on CI and Cp desired

CI: L/day

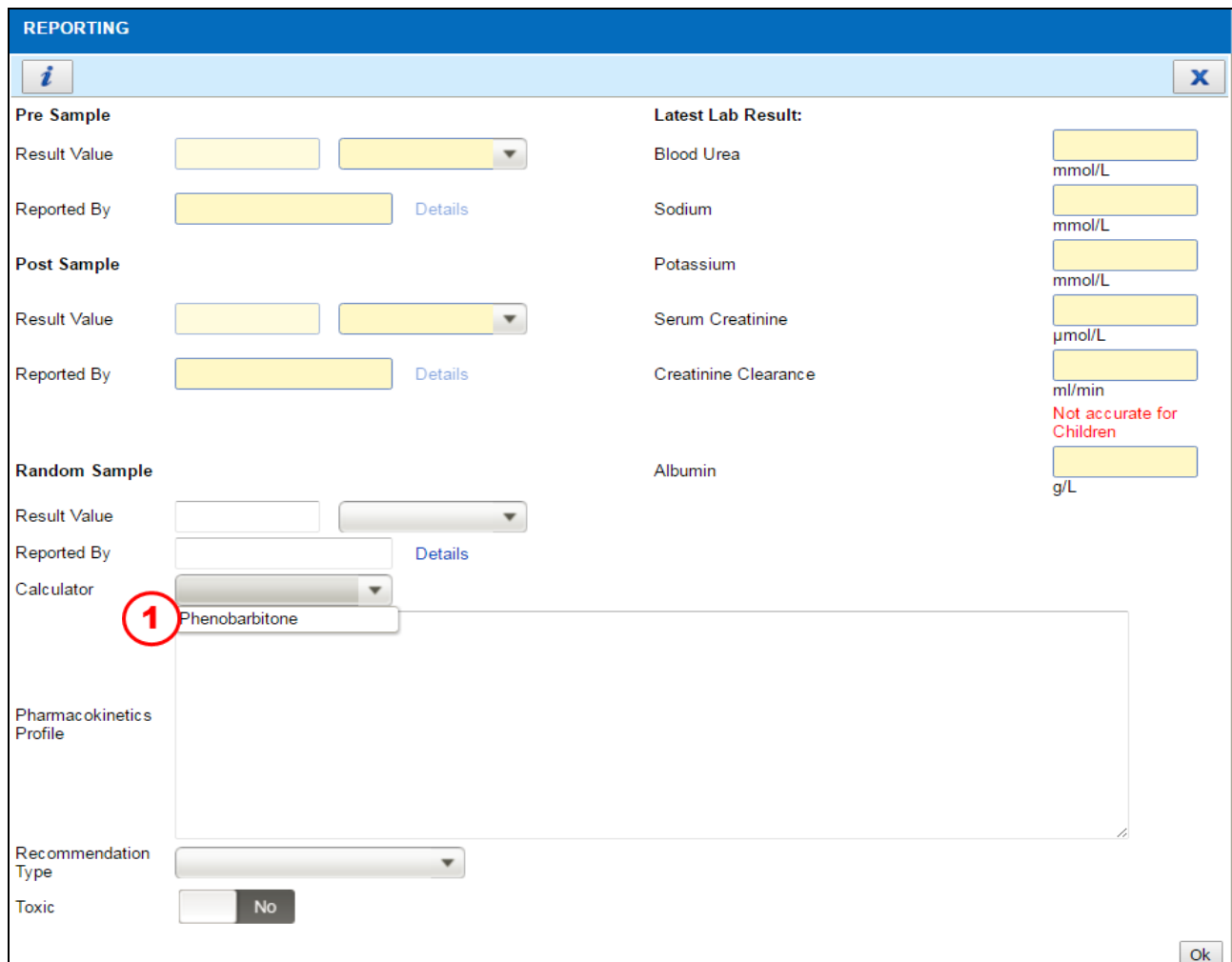
Cp Desired: ng/ml

New Dose: mg/day

Figure 8.0-2 Calculator for Digoxin for Drug Digoxin

9.0 Calculator for Phenobarbitone

To view the calculator in the system, perform the steps below:



REPORTING

Pre Sample

Result Value

Reported By Details

Post Sample

Result Value

Reported By Details

Random Sample

Result Value

Reported By Details

Calculator **1** Phenobarbitone

Latest Lab Result:

Blood Urea mmol/L

Sodium mmol/L

Potassium mmol/L

Serum Creatinine µmol/L

Creatinine Clearance ml/min
Not accurate for Children

Albumin g/L

Pharmacokinetics Profile

Recommendation Type

Toxic No

Ok

Figure 9.0-1 Calculator for Phenobarbitone

STEP 1

Select calculator from dropdown box example:

- Phenobarbitone

Note

- Choose the calculator and fill the result in the box as per Figure 9.0-1. Sample Details consists of:
 - **Phenobarbitone calculator**
 - Dose medication in mg
 - Interval Time in Hours
 - Total Dose in mg/day
 - Cp Measured in mcg/ml
 - Constant CI in ml/kg/hr
 - Vd, Ke and t1/2 based on CI
 - New Maintenance Dose (NMD) based on CI, Cp measured and Cp desired
 - Cpss level based on current dose and CI
 - Expected Cp based on CI and New Suggested Dose (NSD)

- After save the calculator, the result will appear at the Pharmacokinetics Profile box.
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 9.0-1

CALCULATOR FOR PHENOBARBITONE

Body Weight: Actual 70 kg

Dose: mg

Interval(T): hour

S:

Note: Oral / IV = 1

Total Dose: mg/day

Cp measured: mcg/ml

Note: mcg/ml = mg/L

Clearance CP measured: L/day

≈ L/hr

Constant Cl: ml/kg/hr

Note: Adult = 4 ml/kg/hr Children (≤ 12years 11month) = 8 ml/kg/hr Neonate = 4 ml/kg/hr

Clearance (Population): L/day

≈ L/hr

☐ To calculate Vd, Ke and t1/2 based on Cl

Cl: L/hr

Constant Vd: L/kg

Note: Adult = 0.5 L/kg, Neonate = 0.8 - 1 L/kg

Vd: L

Ke: hr⁻¹ t 1/2: hour

☐ To calculate Cpss level based on current dose and Cl

Cl: L/hr

Cpss: mcg/ml

Note: mcg/ml = mg/L

☐ To calculate New Maintenance Dose (NMD) based on Cl, Cp measured and Cp desired

Cp desired: mcg/ml

Note: mcg/ml = mg/L

Cl: L/day

New Dose: mg/day

☐ To calculate Expected Cp based on Cl and New Suggested Dose(NSD)

Cl: L/day

NSD: mg/day

Expected Cp: mcg/ml

Note: mcg/ml = mg/L

Figure 9.0-2 Calculator for Phenobarbitone for Drug Phenobarbitone

10.0 Calculator for Phenytoin

To view the calculator in the system, perform the steps below:

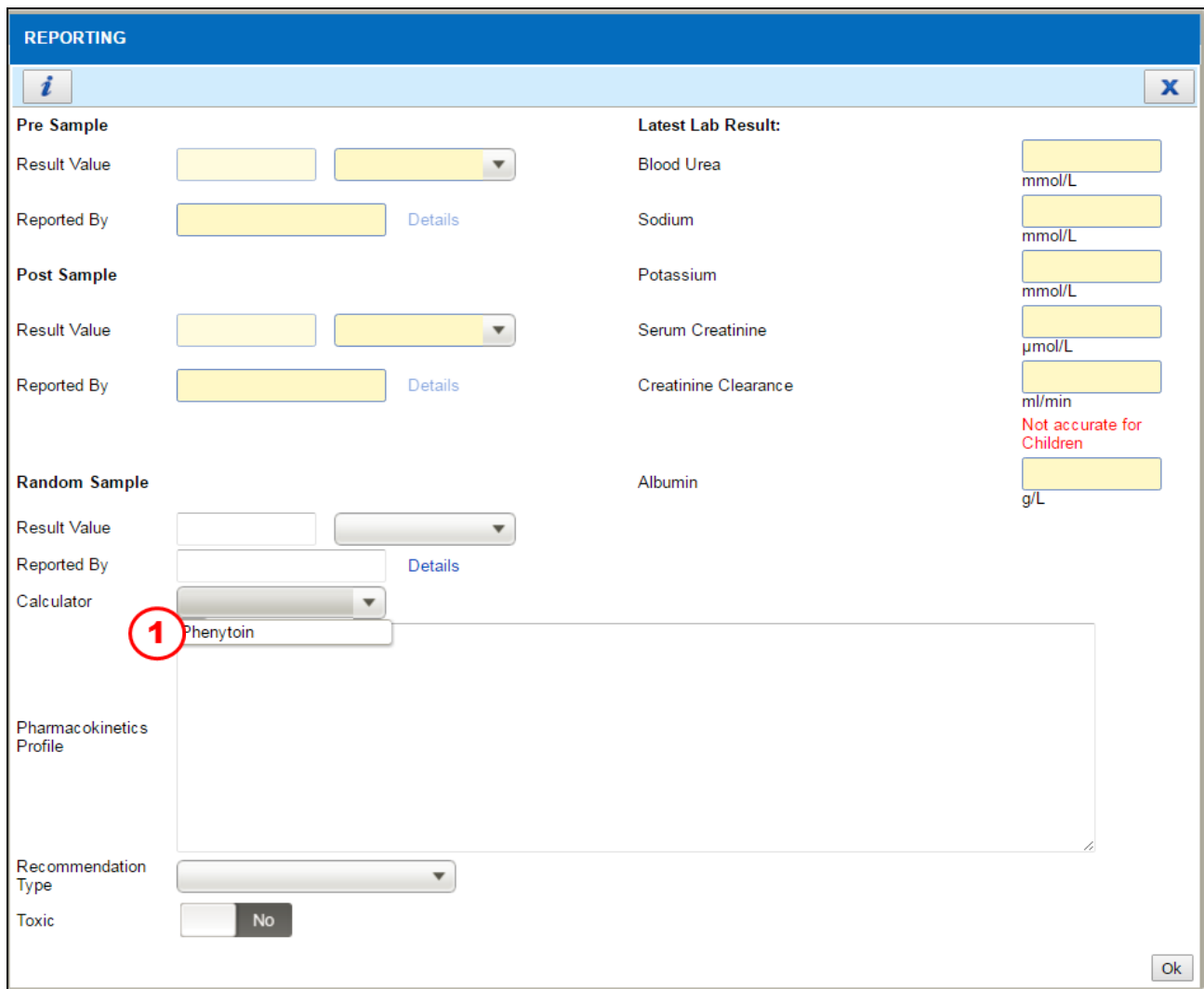


Figure 10.0-1 Calculator for Phenytoin

STEP 1

Select calculator from dropdown box example:

- Phenytoin

Note

- Choose the calculator and fill the result in the box as per Figure 10.0-1. Sample Details consists of:
 - **Phenytoin calculator**
 - Total Dose in mg/day
 - Albumin g/dl
 - Choose patient condition between **Without Hypoalbuminemia, Hypoalbuminemia or Hypoalbuminemia with ESRF**
 - Without Hypoalbuminemia**
 - Cp Measured in mcg/ml
 - Vmax (population)
 - Vd, Ke, t1/2 and Cl based on Vmax
 - Cpss level based on Vmax
 - Incremental Loading Dose (ILD) based on Cp desired and Cp measured

- f. Loading Dose (LD) based on C_p desired
- g. therapy withhold period (T) when level is toxic
- h. New Maintenance Dose (NMD) based on V_{max} and C_p desired

Hypoalbuminemia/Hypoalbuminemia with ESRF

- a. C_p Measured in mcg/ml
- b. Corrected C_p Measured in mcg/ml
- c. V_{max} (population)
- d. V_d , K_e , $t_{1/2}$ and Cl based on V_{max}
- e. C_{pss} level based on V_{max}
- f. Incremental Loading Dose (ILD) based on C_p desired and C_p measured
- g. Loading Dose (LD) based on C_p desired
- h. therapy withhold period (T) when level is toxic
- i. New Maintenance Dose (NMD) based on V_{max} and C_p desired

- After save the calculator, the result will appear at the Pharmacokinetics Profile box.
- Calculator is optional only user can direct type at the Pharmacokinetics Profile box without using the calculator as per Figure 10.0-1

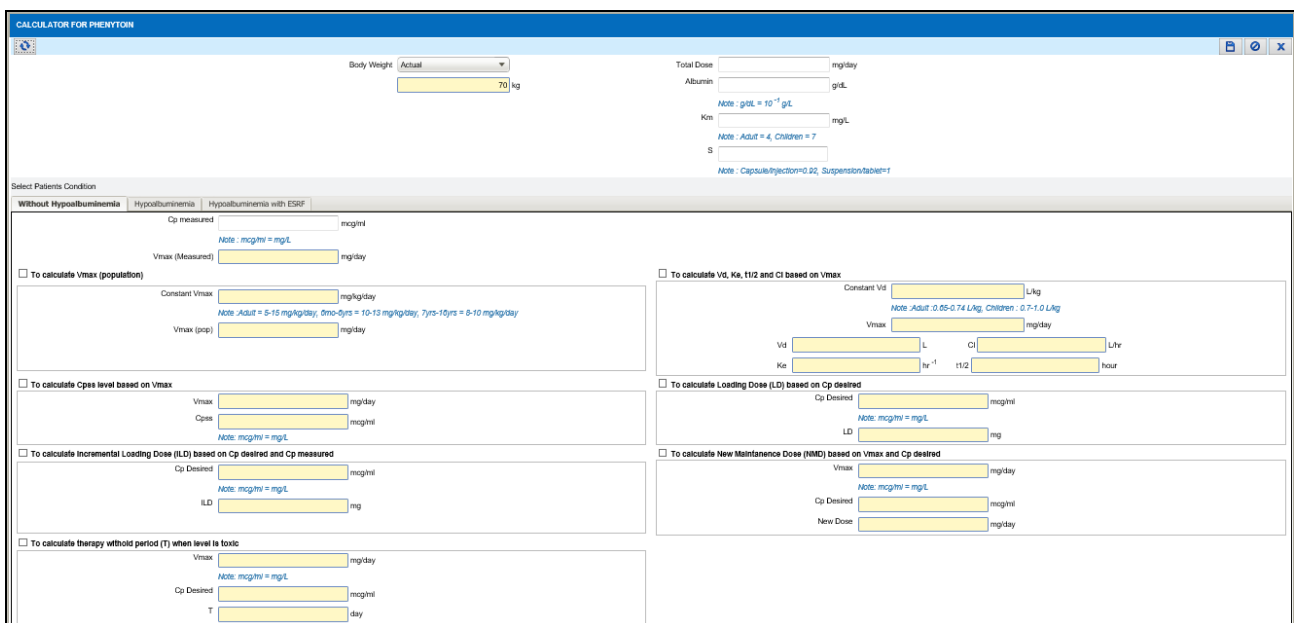


Figure 10.0-2 Calculator for Phenytoin for Drug Phenytoin

11.0 Acronyms

Abbreviation	Definition
PhIS	Pharmacy Information System
CPS	Clinical Pharmacy System
PM	Patient Management
eGL	Electronic Guarantee Letter
HRMIS	Human Resource Management Informasi System
MRN	Medical Record Number
MOH	Ministry Of Health

12.0 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		