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

Pharmacy Based

User Manual
TDM Calculator

Version	**: 8th EDITION**
Document ID	**: PB_U. MANUAL_TDM CALCULATOR**

Reference ID : PB_U. MANUAL_TDM CALCULATOR-8th EDITION

Application reference: PhIS & CPS v1.8.1

Table of Contents

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	Login to PhIS	Logout	Logout from PhIS
Change Password	Change Login Password		Reset Login Screen
	Expand Menu		Collapse Menu
Home	Display Home Tab		Expand Module
	Collapse Module		Close All Open Tabs
	Refresh Screen	Search	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 to Excel	Export and Open Report in Excel Format
Add Item	Add Item to the list	Delete	Delete Item from the list
Request	Request for Approval	Cancel Request	Cancel the Request
Approve	Approve Transaction	Reject	Reject Transaction
Send for Approval	Send for Approval		Dropdown Box
HPSF00088304	Automatically Display/Retrieve Box		Empty Text Box

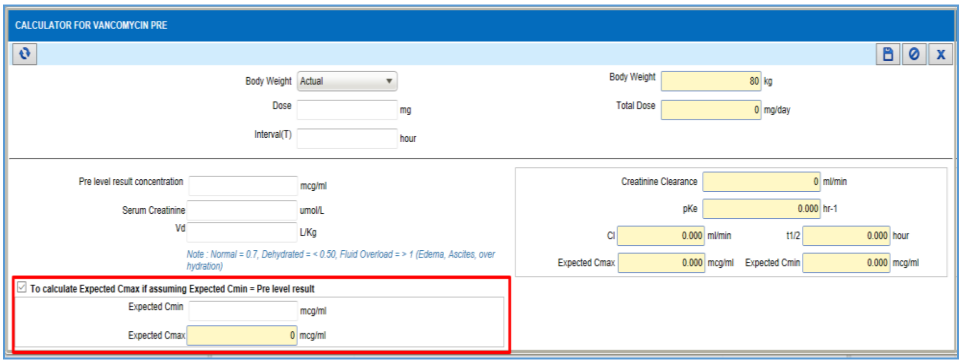
Therapeutic Drug Monitoring Module Legend			
Acknowledge	To Acknowledge	Drug Info	Drug Info
New	To Do New Order	Verify	To Verify
Cancel Order	Cancel the Order	Add New Sample	To Add New Sample
Send	To send request	CP2	Ward Pharmacy

Note

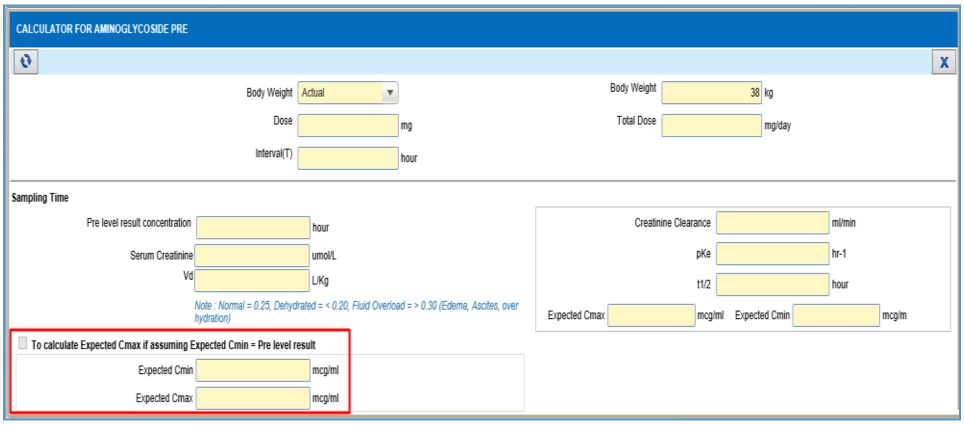
To learn more about Login Information, kindly click [Login Information](#) module for descriptive steps.

2.2 Latest Enhancement and Updates

<table>
<tr><th>Latest Functions</th><th>Page</th></tr>
<tr><td>
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:
=Expected Cmin/(EXP(-pKe*Interval(T)))
</td><td>6</td></tr>
<tr><td>
New Calculator for Aminoglycoside Pre



- Added check box to activate the calculator.
- Added Expected Cmin - Free text field
- Added Expected Cmax – Formula:
=Expected Cmin/(EXP(-pKe*Interval(T)))
</td><td>10</td></tr>
</table>

3.0 Calculator for Vancomycin

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

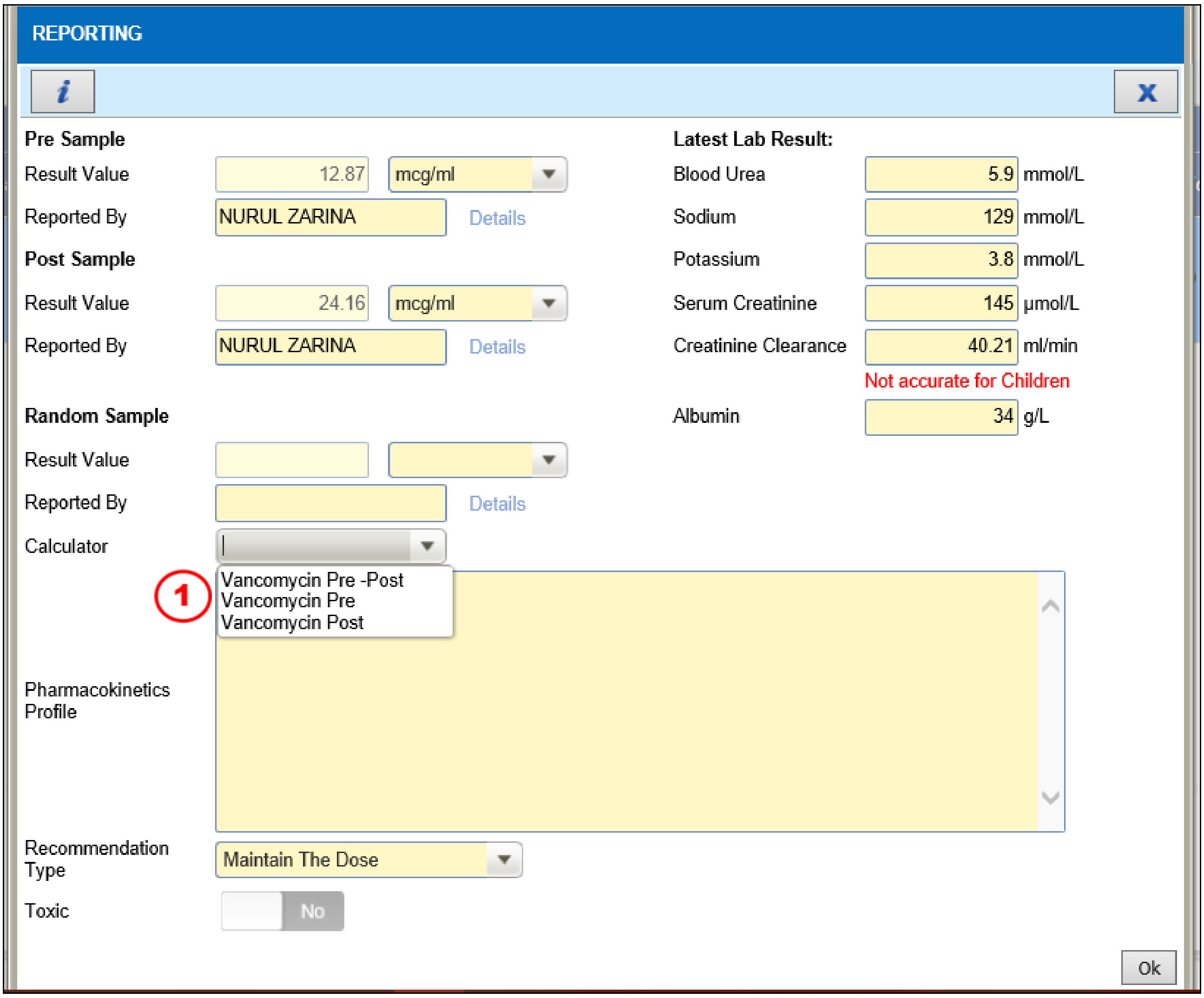


Figure 3.0-1 Pre Calculator for Vancomycin Detail

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

- ➢ *Calculator for **Vancomycin Pre & Post***
  - *a. Dose medication in mg*
  - *b. Interval Time*
  - *c. Sampling Time: Duration between time after complete infusion and post sampling(t) and Duration between completion time of pre and post sampling (t2-t1)*
  - *d. Serum level: Pre level result concentration, Post level result concentration and Serum Creatinine*
  - *e. Vd, Ke and t1/2*
  - *f. Area Under Curve (AUC) Over 24hrs*
  - *g. New dose and Cmin based on desired Cmax*
  - *h. Expected Cmin and Cmax if Vd varies*
  - *i. 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*

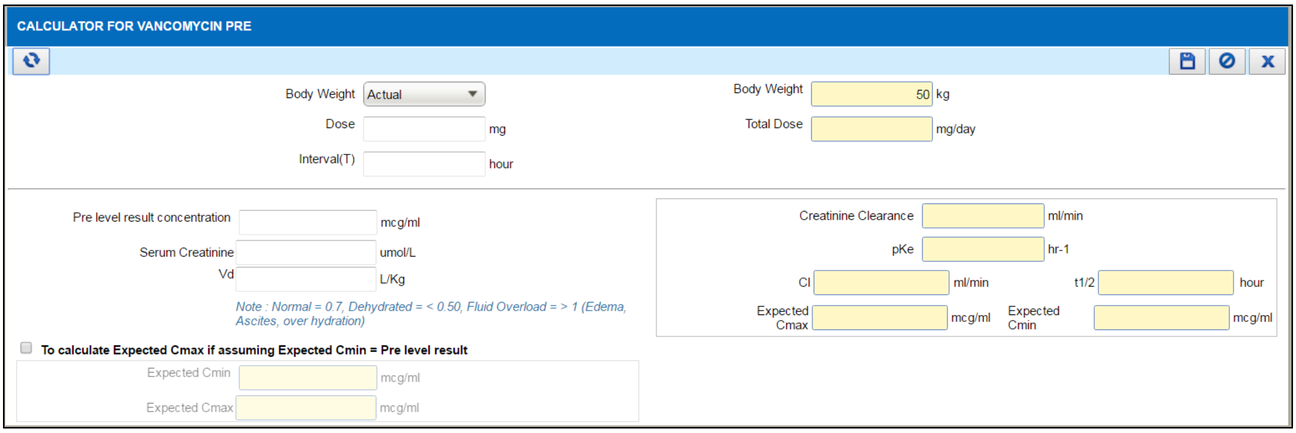


Figure 3.0-2 Pre Calculator for Vancomycin Detail

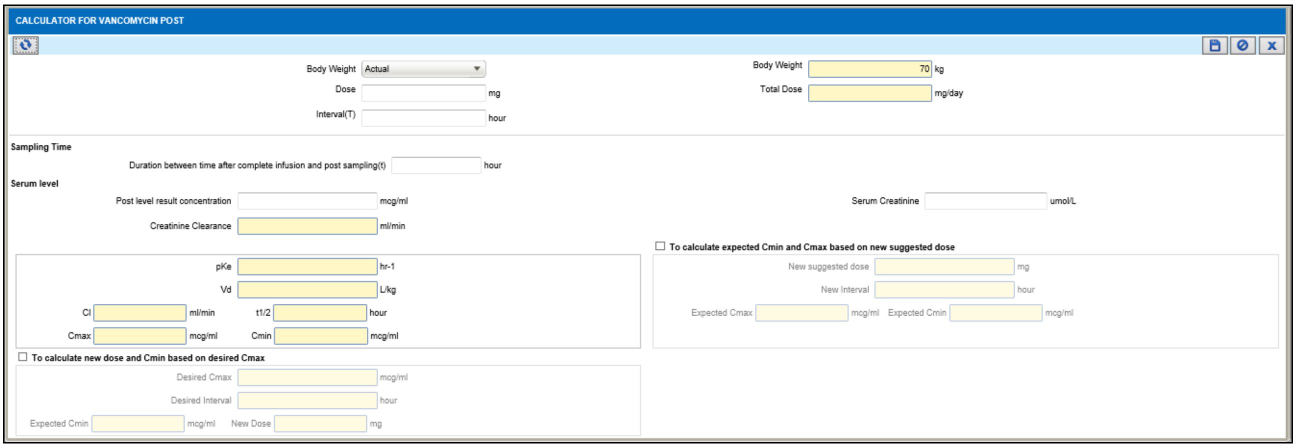


Figure 3.0-3 Post Calculator for Vancomycin Detail

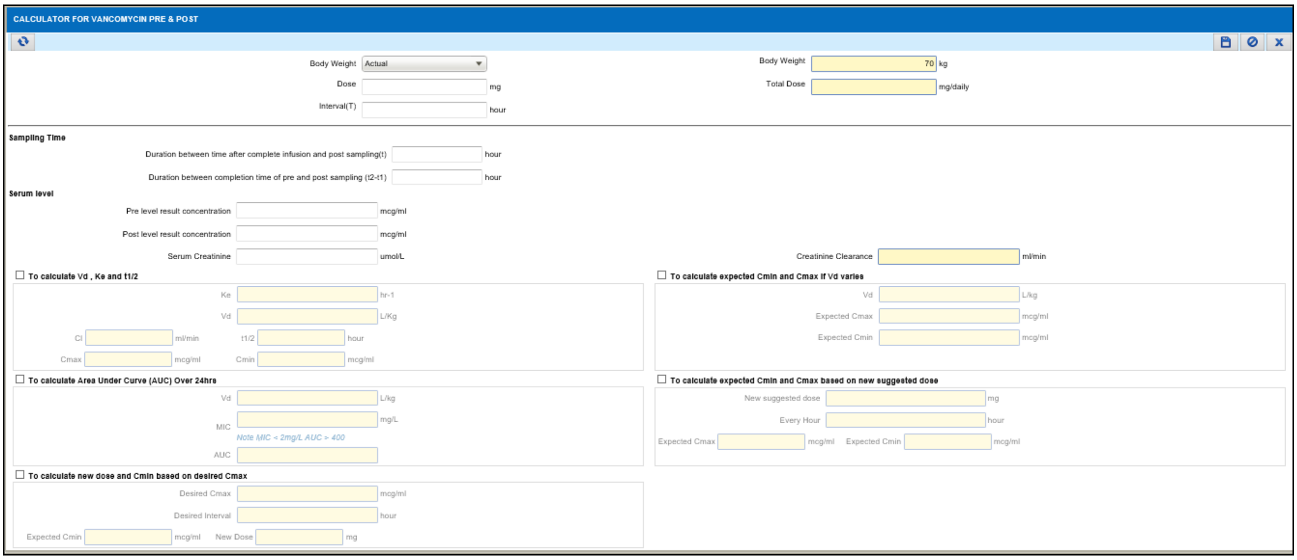


Figure 3.0-4 Pre & Post Calculator for Vancomycin Detail

4.0 Calculator for Gentamicin / Amikacin

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

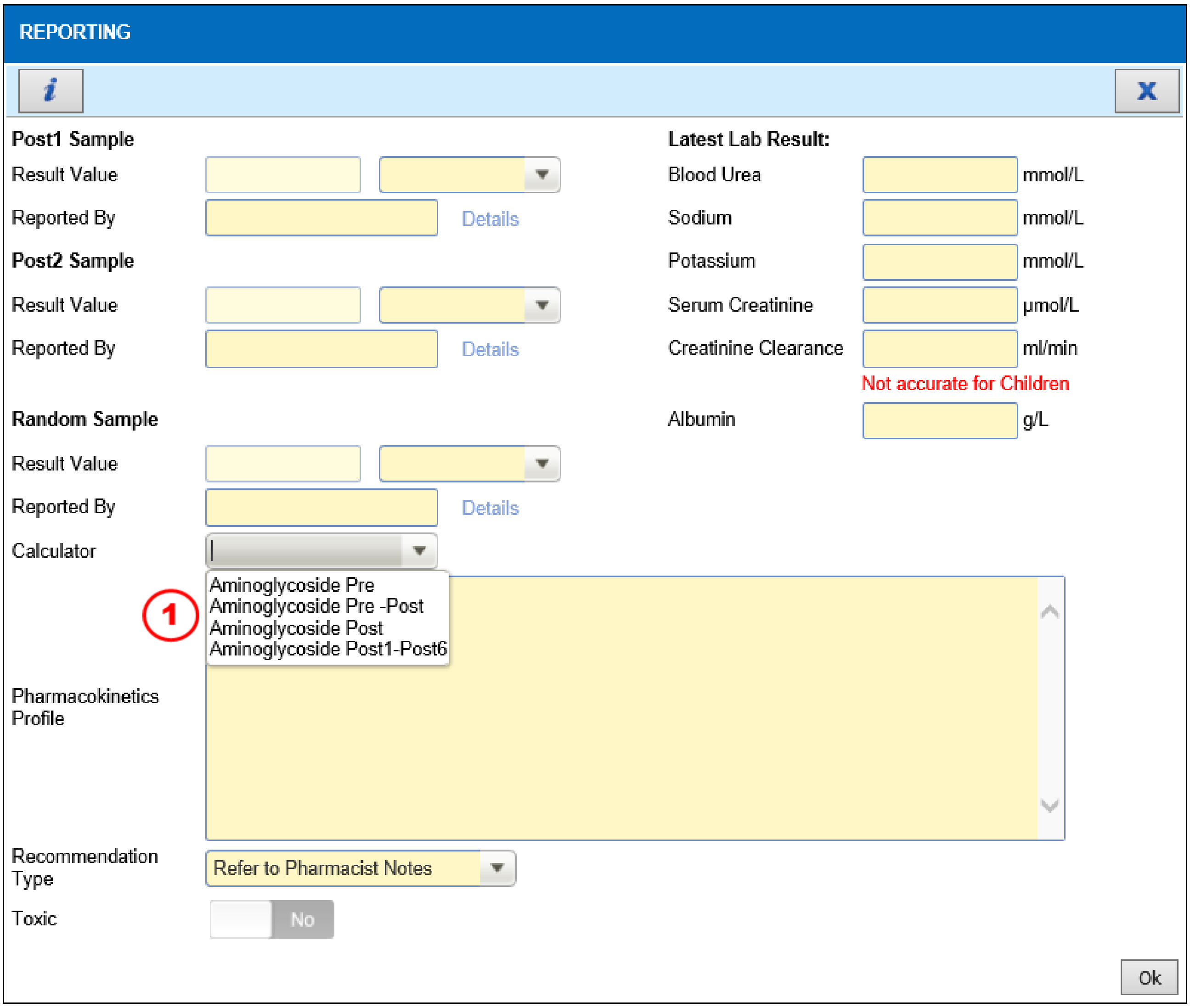


Figure 4.0-1 Calculator for Gentamicin / Amikacin

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***

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

➢ Calculator for ***Aminoglycoside Pre & Post***

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

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

a. Dose medication in mg
b. Interval Time
c. 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)
d. Serum level: Post 1 level result concentration, Post 6 level result concentration and Serum Creatinine
e. Vd, Ke and t1/2
f. New dose and Cmin based on desired Cmax
g. 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*

-

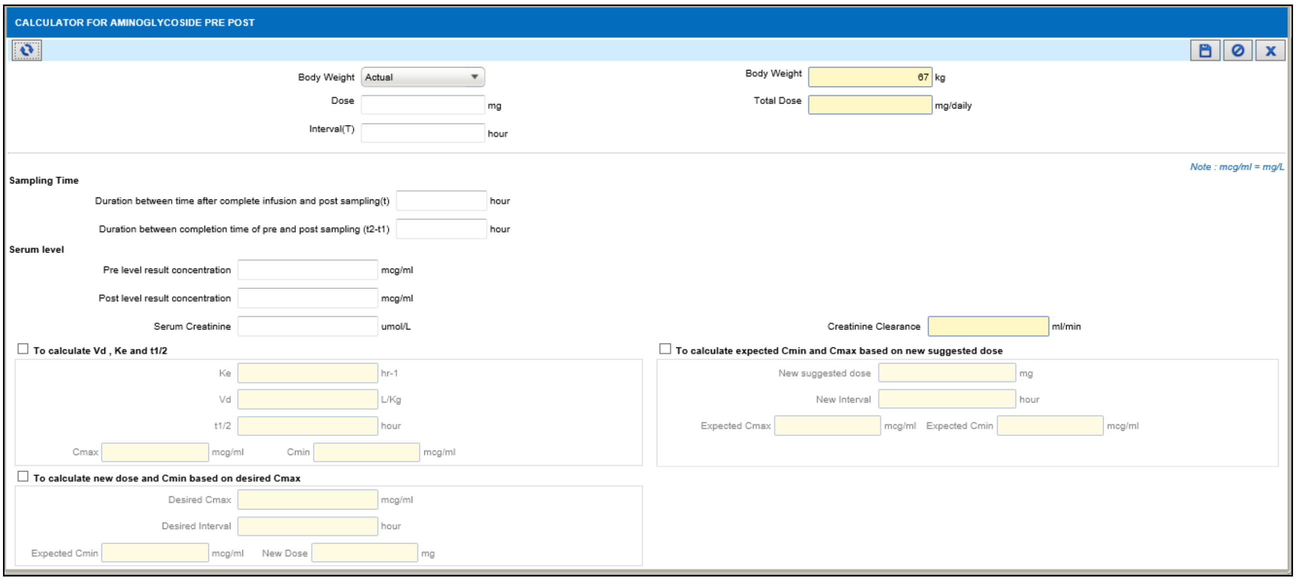


Figure 4.0-2 *Calculator for Aminoglycoside Pre-Post Detail*

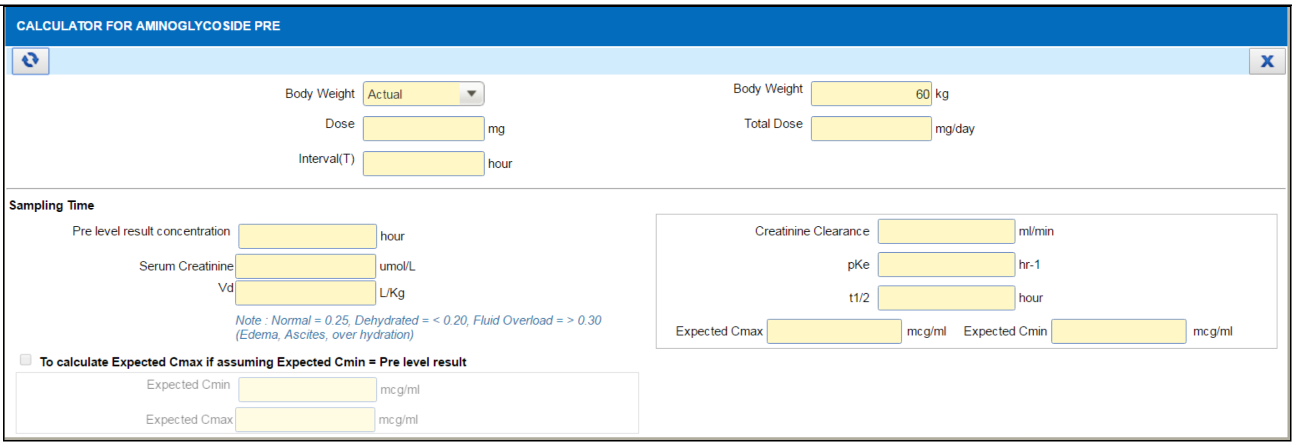


Figure 4.0-3 ***Calculator for Aminoglycoside Pre Detail***

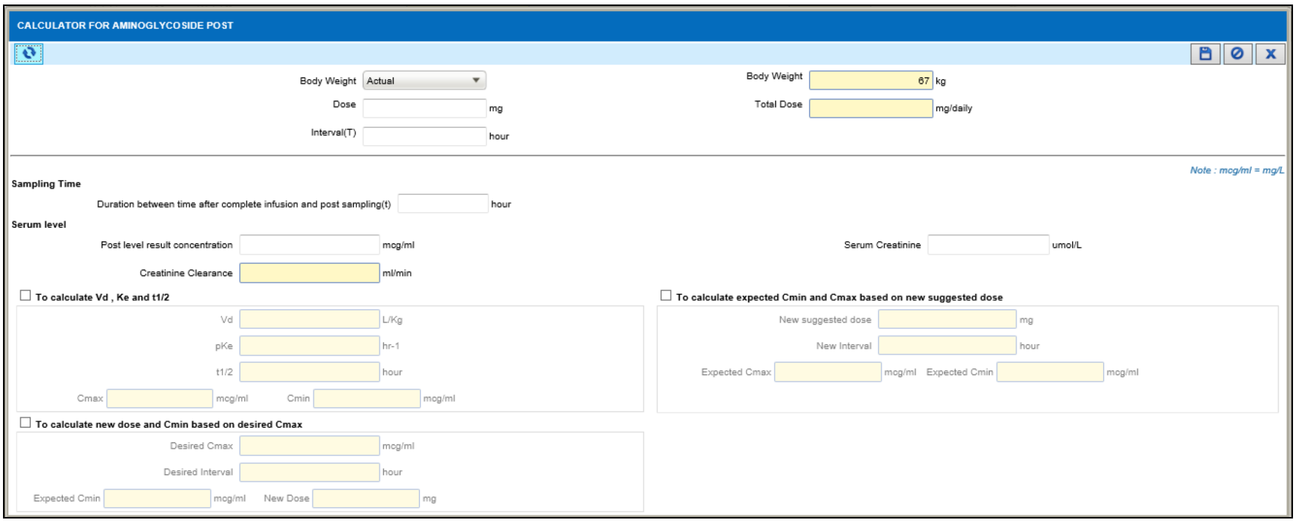


Figure 4.0-4 ***Calculator for Aminoglycoside Post Detail***

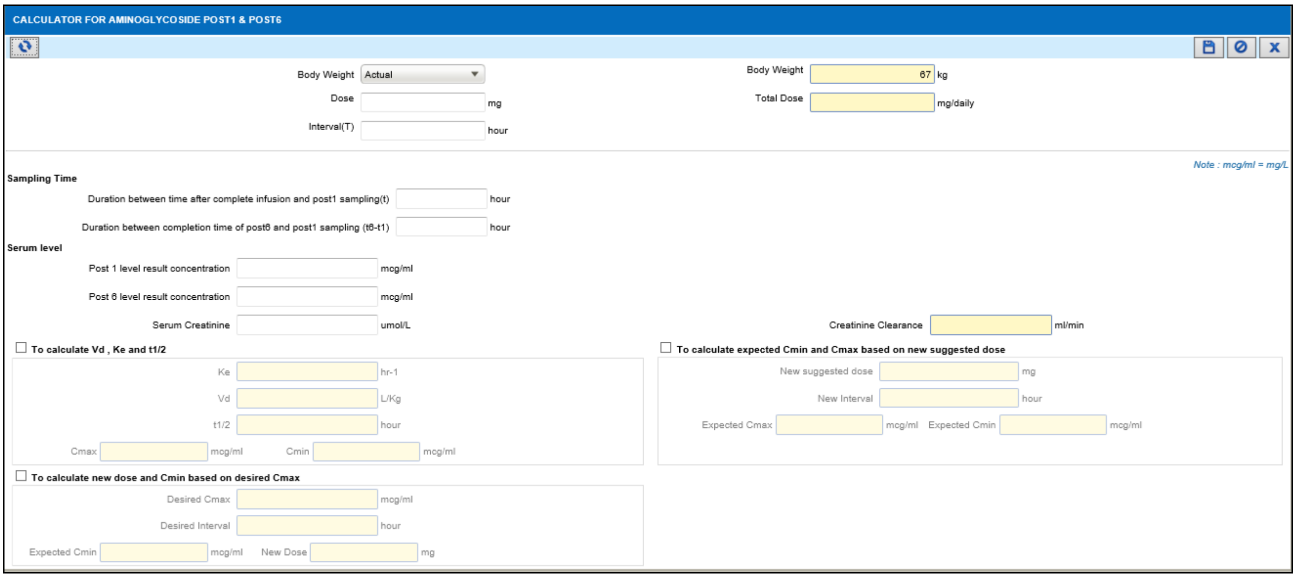


Figure 4.0-5 Calculator for Aminoglycoside Pre 1-Post 6 Detail

5.0 Calculator for Valproic Acid

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

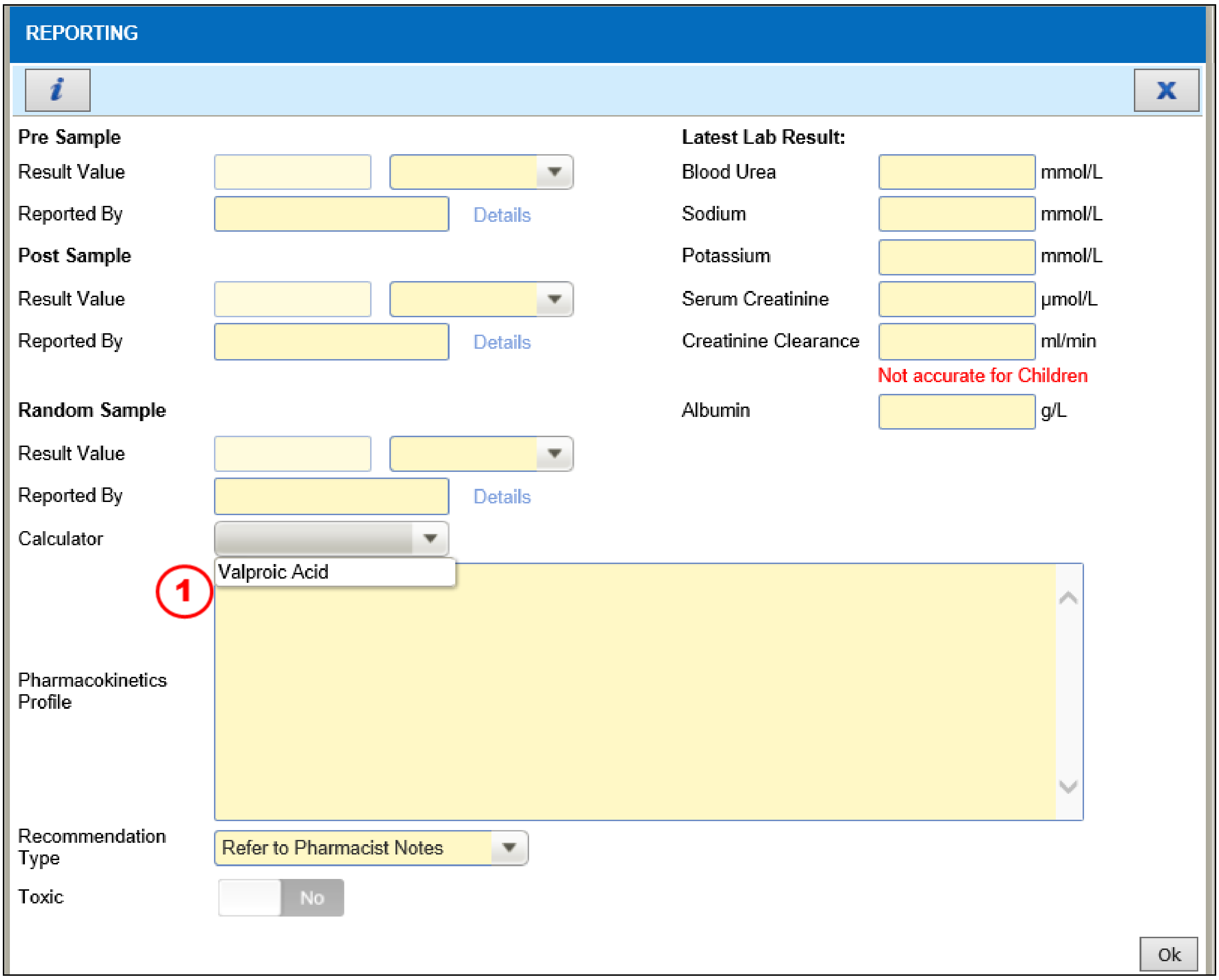


Figure 5.0-1 Calculator for Valproic Acid

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*
      - ✓ ***Monotheraphy****- 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 Maintanence Dose (NMD) based on I, Cp measured and Cp desired*
    - *Cpss level based on current dose and Cl*

- *Expected Cp 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*

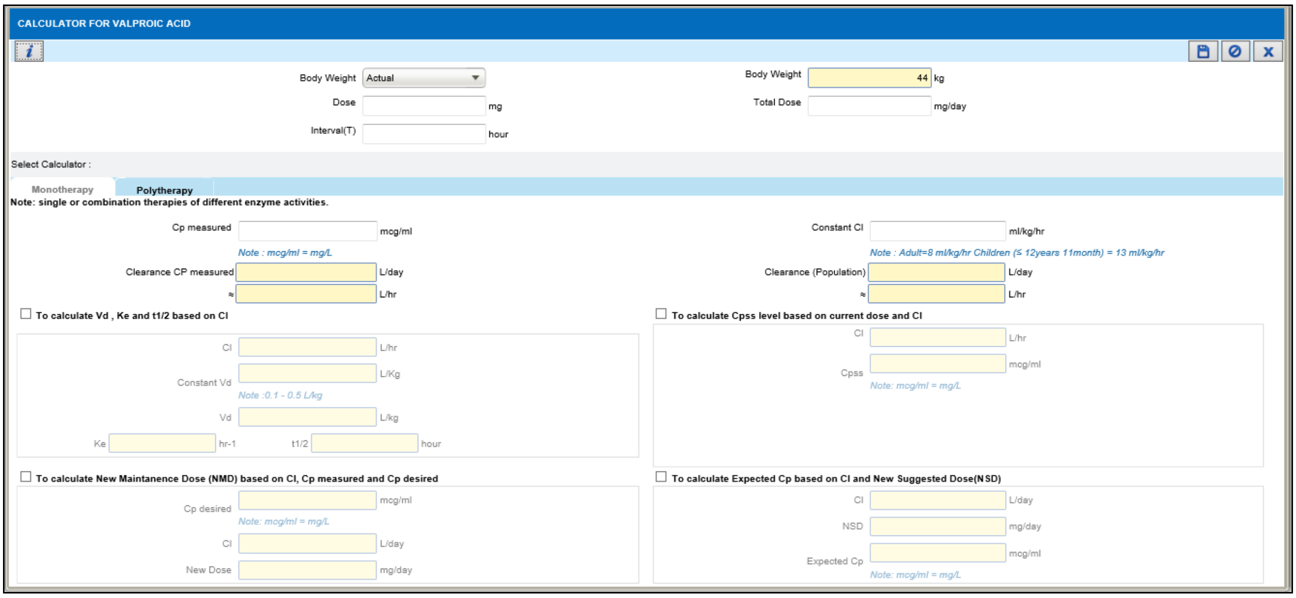


Figure 5.0-2 Calculator for Valproic Acid Detail

6.0 Calculator for Aminophyline / Theophyline

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

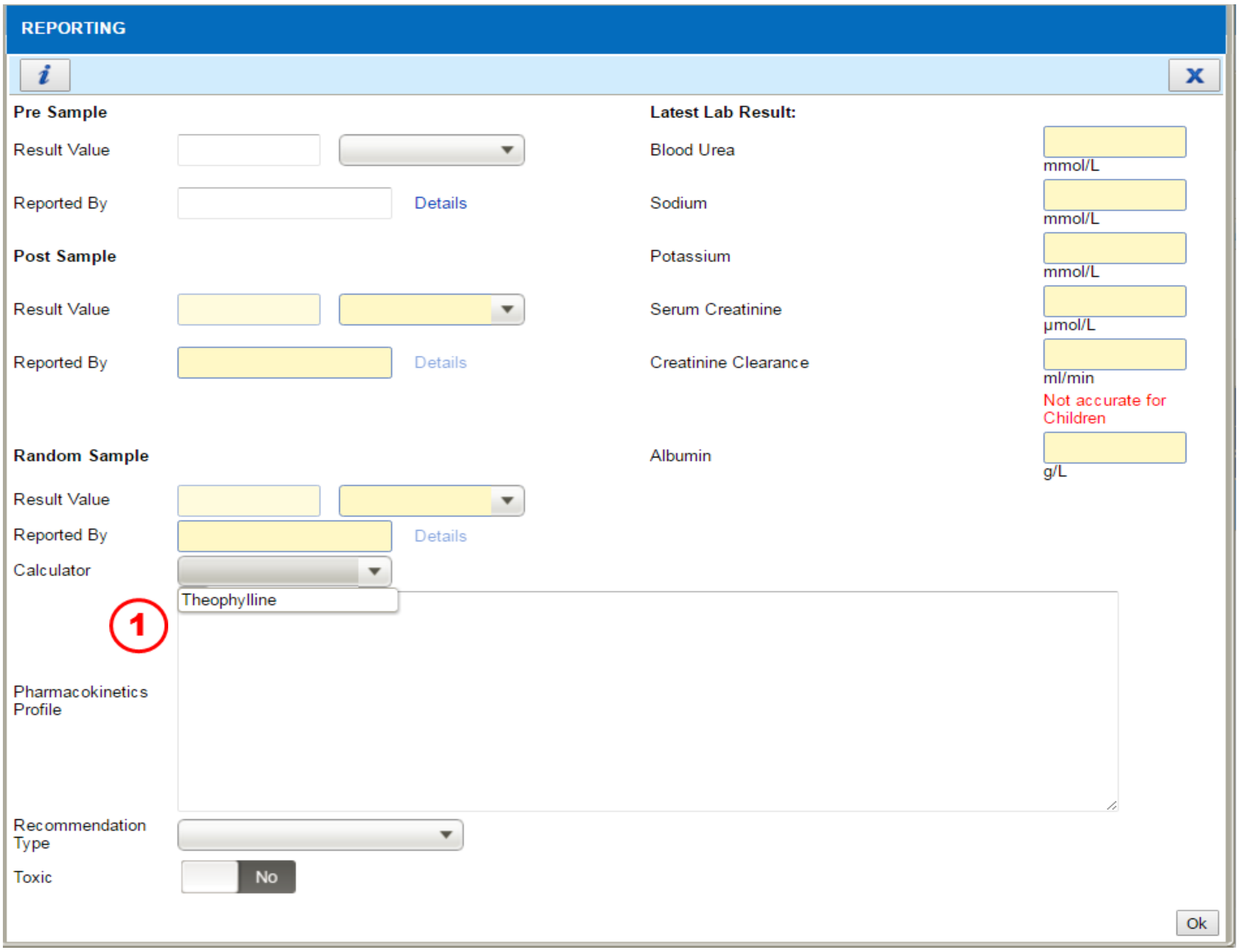


Figure 6.0-1 Calculator for Aminophyline / Theophyline

STEP 1

Select calculator from dropdown box example:

- Aminophyline / Theophyline

Note

- *Choose the calculator and fill the result in the box as per Figure 6.0-1. Sample Details consists of:*
  - ➢ ***Theophyline** calculator*
  - - *Choose between oral or iv*

    Oral

    a. *Dose medication in mg/hr*
    b. *Cp measured in mcg/ml*
    c. *Clearance based on patient's factor(s)*
    d. *Ke and t1/2 based on Cl*
    e. *Loading Dose (LD) if NO Theophylline given within 24 hours*
    f. *Loading Dose (LD) if NO Theophylline given within 24 hours*
    g. *Withold Therapy Period (T) if level is SUPRA-therapeutic based on Cp desired and Ke*
    h. *IV Aminophylline to Oral*
    i. *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 Cp desired and Vd*
l. *Infusion rate (Ko) based on Cp desired and Cl*

<u>Intravenous (iv)</u>

a. *Dose medication in mg*
b. *Interval (T) in hours*
c. *Cp measured in mcg/ml*
d. *Clearance based on patient's factor(s)*
e. *Ke and t1/2 based on Cl*
f. *Loading Dose (LD) based on Cp desired and Vd*
g. *Incremental Loading Dose (ILD) if level is SUB-therapeutic based on Cp desired and Vd*
h. *New Maintanence Dose (IMD) based on Cp desired and Cl*
i. *Cpss level based on current dose and Cl*
j. *New Dose (Ko) based on Cp and Cl 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*

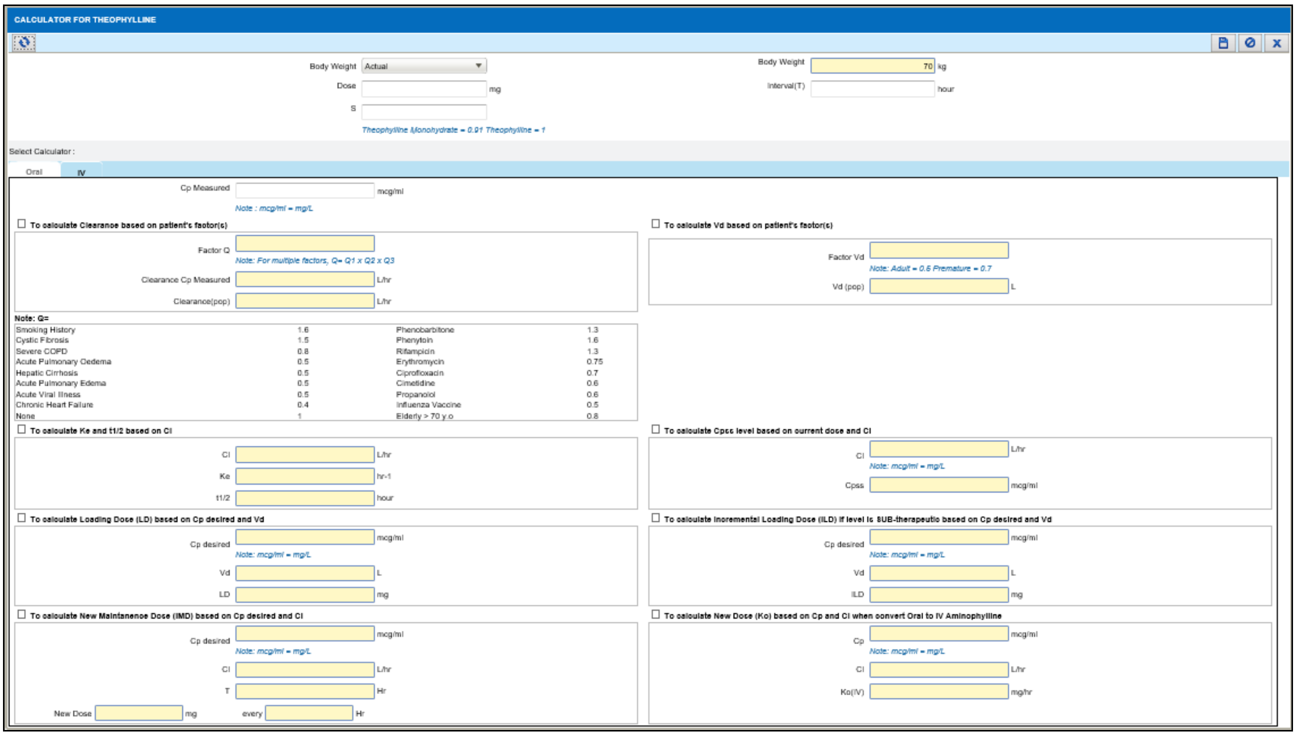


Figure 6.0-2 Calculator for Theophylline for Drug Aminophylline

7.0 Calculator for Carbamazepine

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

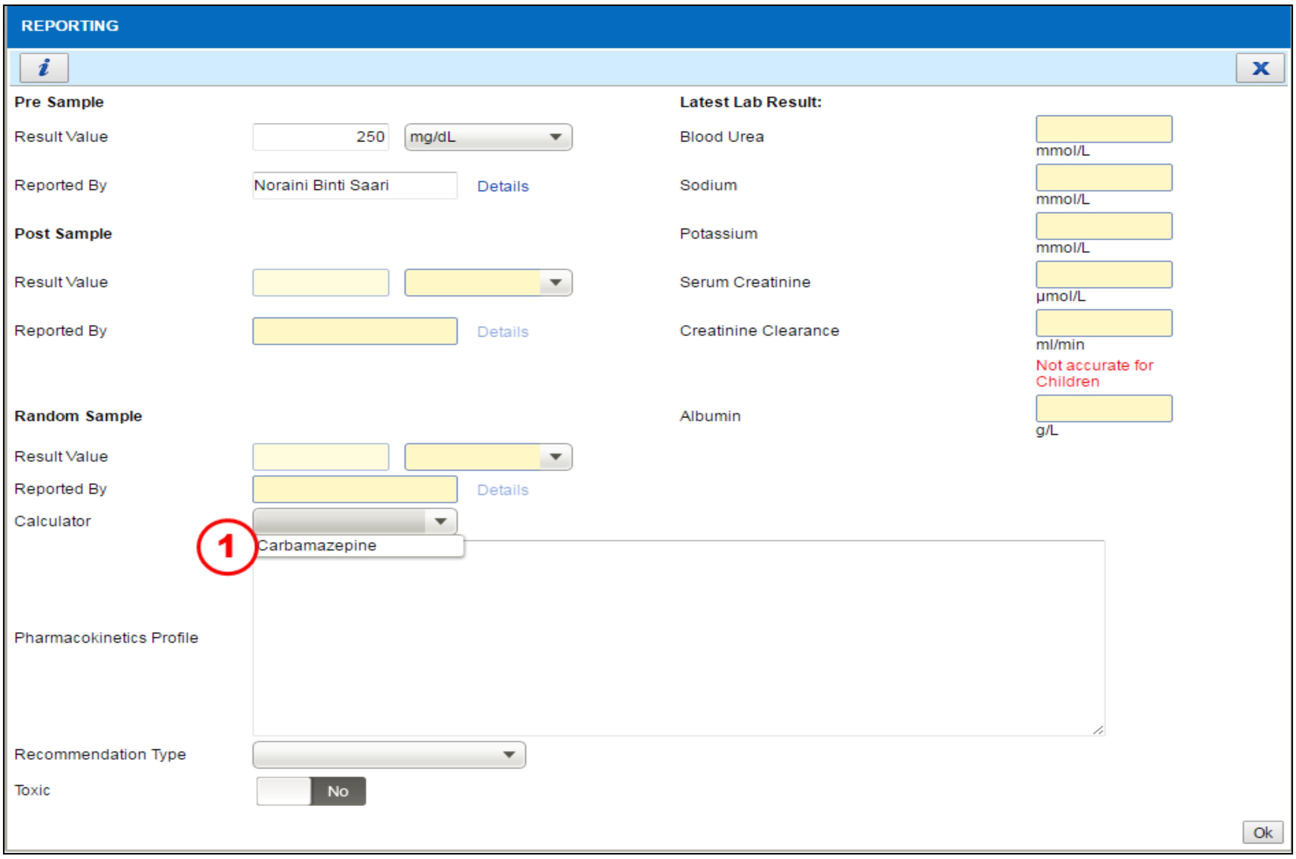


Figure 7.0-1 Calculator for Carbamazepine

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*
      - ✓ ***Monotheraphy**- 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 Maintanence 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*

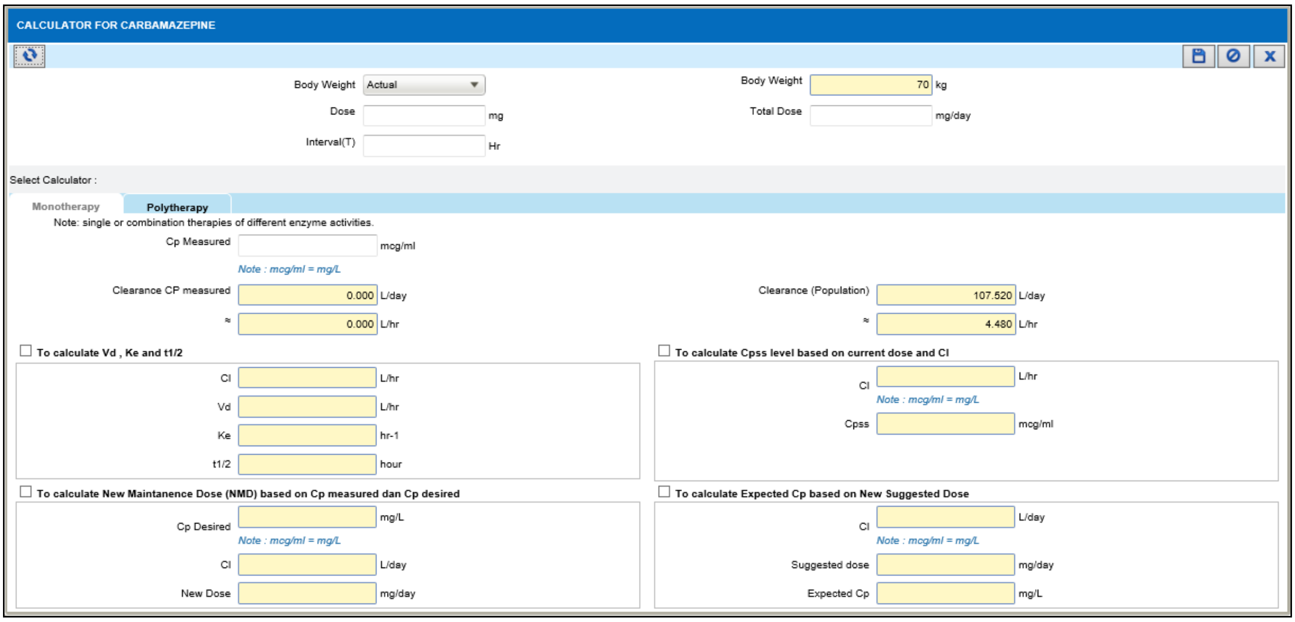


Figure 7.0-2 Calculator for Carbamazepine for Drug Carbamazepine

8.0 Calculator for Digoxin

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

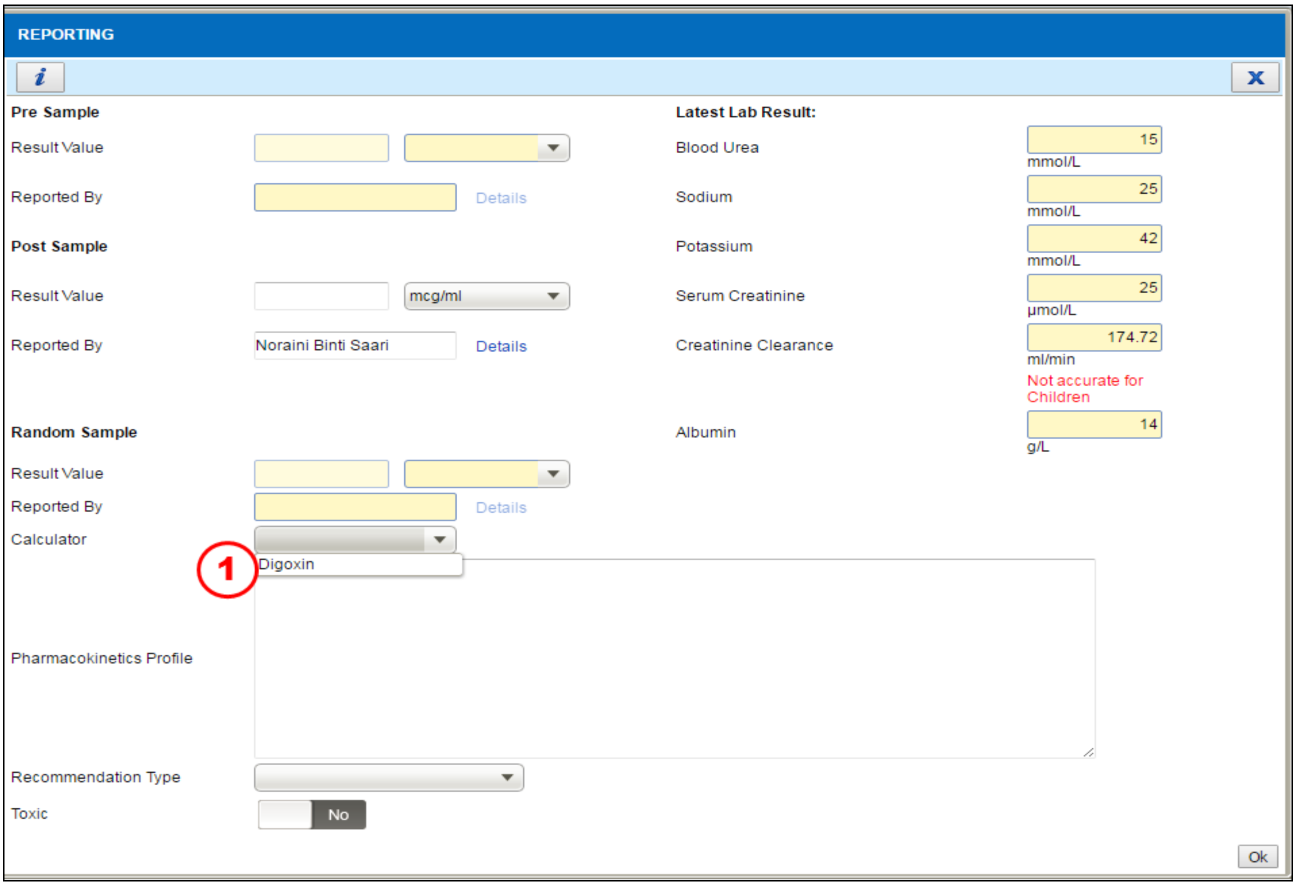


Figure 8.0-1 Calculator for Digoxin

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 Maintanence 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*

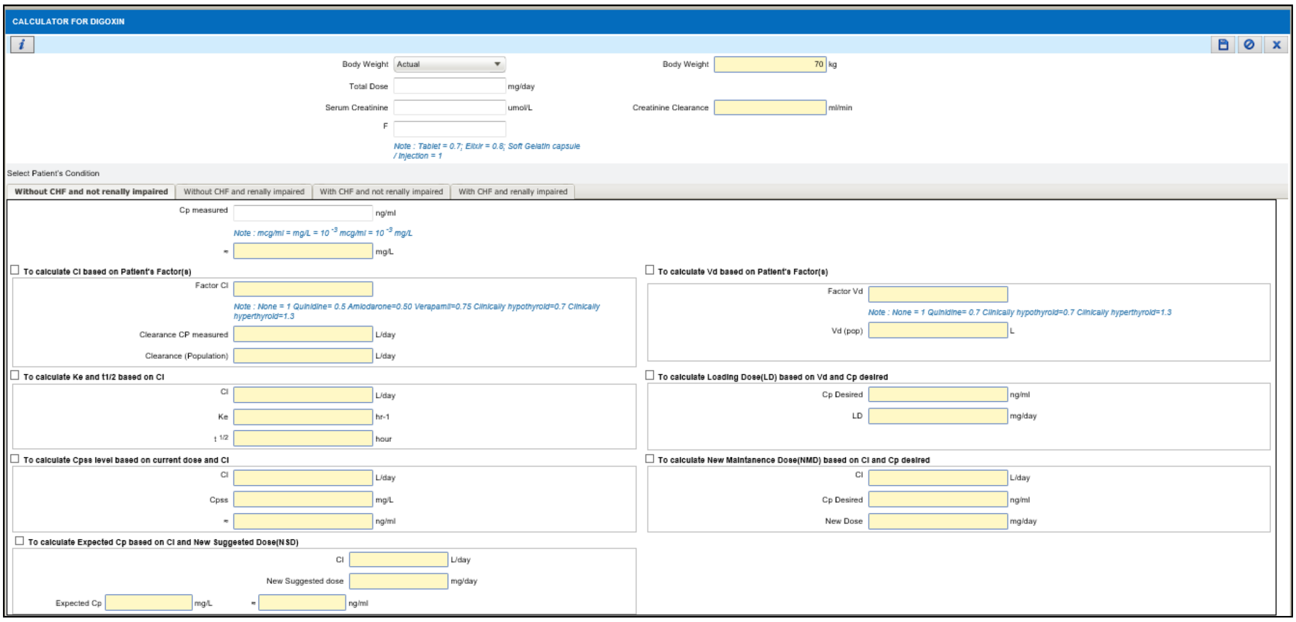


Figure 8.0-2 Calculator for Digoxin for Drug Digoxin

9.0 Calculator for Phenobarbitone

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

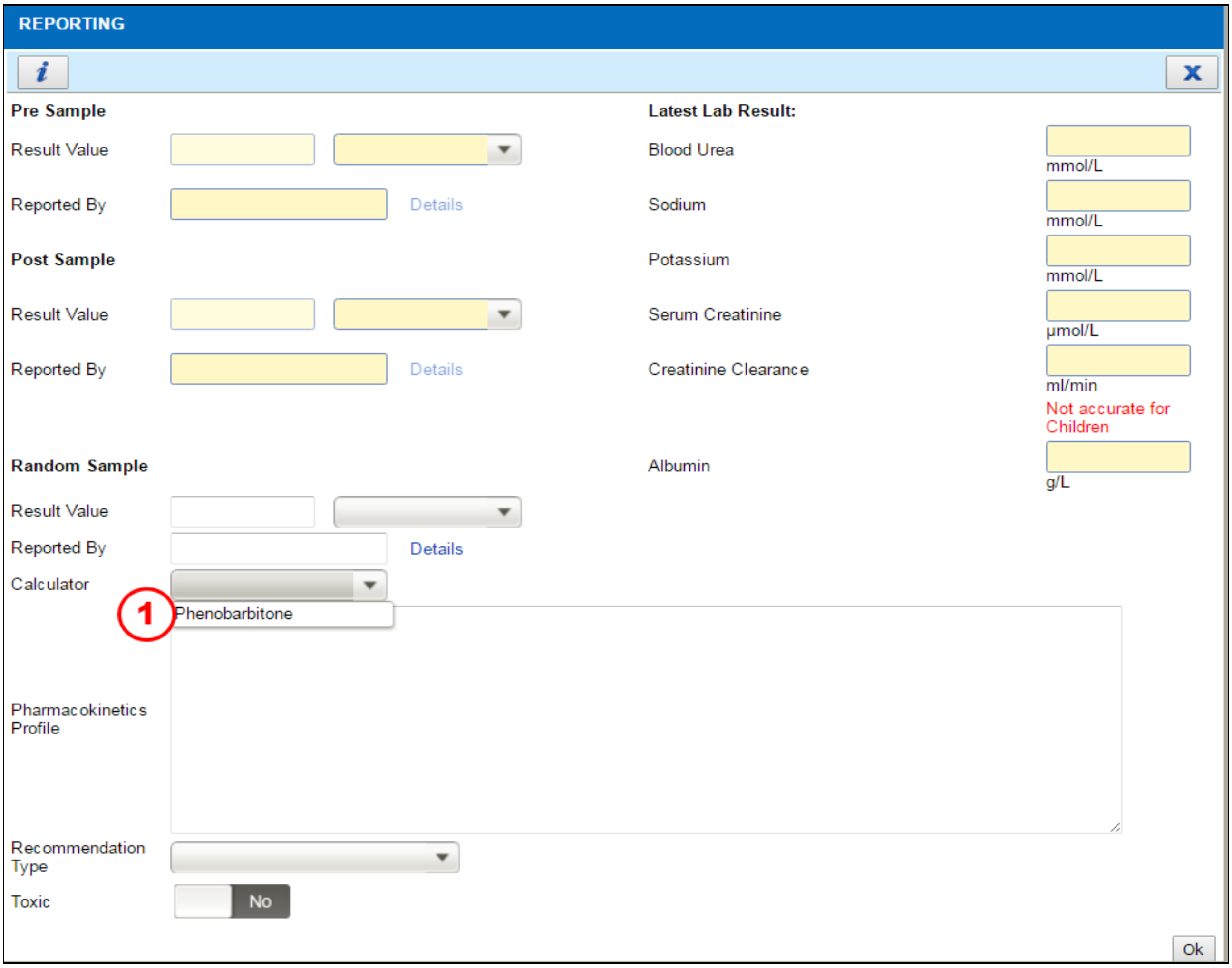


Figure 9.0-1 Calculator for Phenobarbitone

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 Cl in ml/kg/hr*
    - *Vd , Ke and t1/2 based on Cl*
    - *New Maintanence Dose (NMD) based on Cl, Cp measured and Cp desired*
    - *Cpss level based on current dose and Cl*
    - *Expected Cp 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 9.0-1*

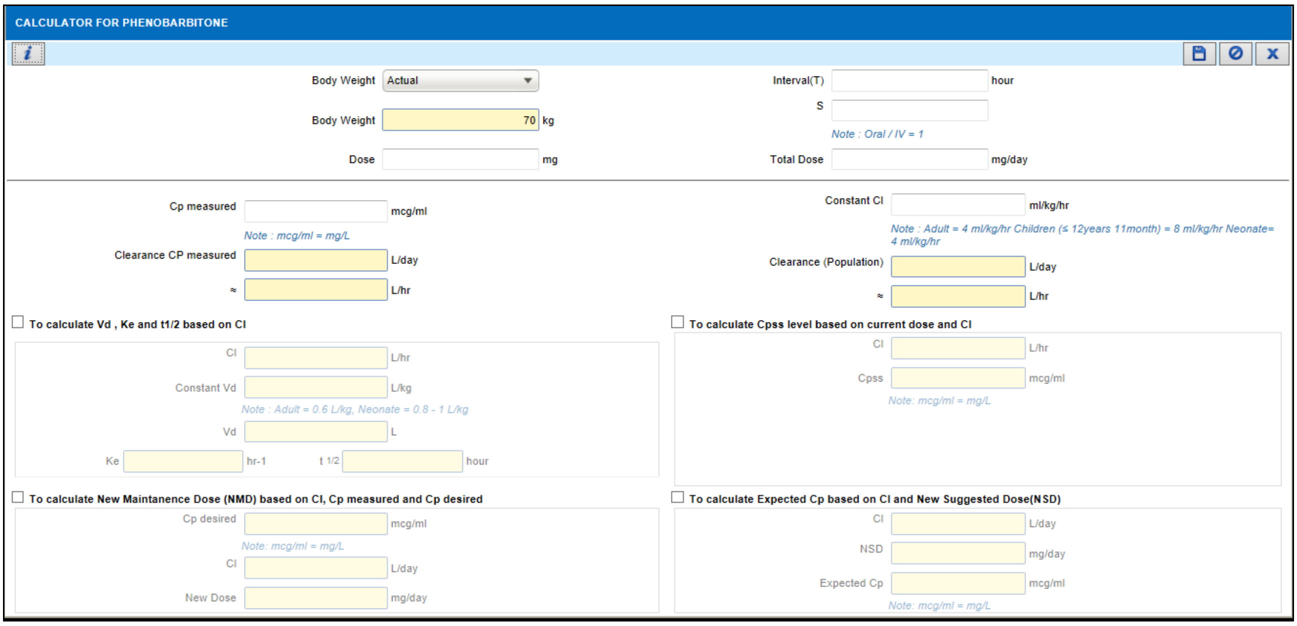


Figure 9.0-2 Calculator for Phenobarbitone for Drug Phenobarbitone

10.0 Calculator for Phenytoin

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

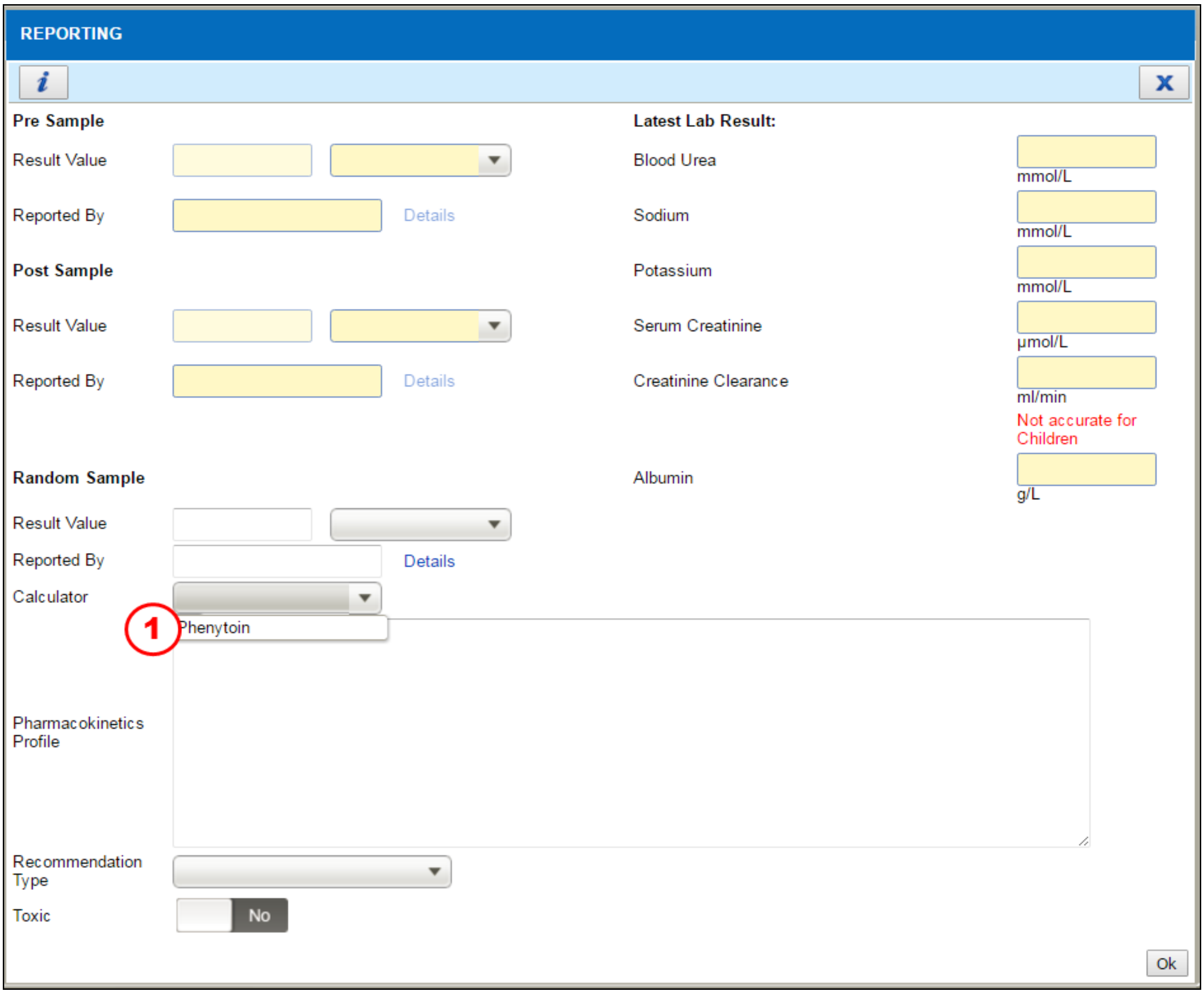


Figure 10.0-1 Calculator for Phenytoin

STEP 1

Select calculator from dropdown box example:

- Phenytoin

<u>Note</u>

- *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***

<u>Without Hypoalbuminemia</u>

a. *Cp Measured in mcg/ml*
b. *Vmax (population)*
c. *Vd, Ke, t1/2 and Cl based on Vmax*
d. *Cpss level based on Vmax*
e. *Incremental Loading Dose (ILD) based on Cp desired and Cp measured*

f. *Loading Dose (LD) based on Cp desired*
g. *therapy withold period (T) when level is toxic*
h. *New Maintanence Dose (NMD) based on Vmax and Cp desired*

<u>Hypoalbuminemia/Hypoalbuminemia with ESRF</u>

a. *Cp Measured in mcg/ml*
b. *Corrected Cp Measured in mcg/ml*
c. *Vmax (population)*
d. *Vd, Ke, t1/2 and Cl based on Vmax*
e. *Cpss level based on Vmax*
f. *Incremental Loading Dose (ILD) based on Cp desired and Cp measured*
g. *Loading Dose (LD) based on Cp desired*
h. *therapy withold period (T) when level is toxic*
i. *New Maintanence Dose (NMD) based on Vmax 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 10.0-1*

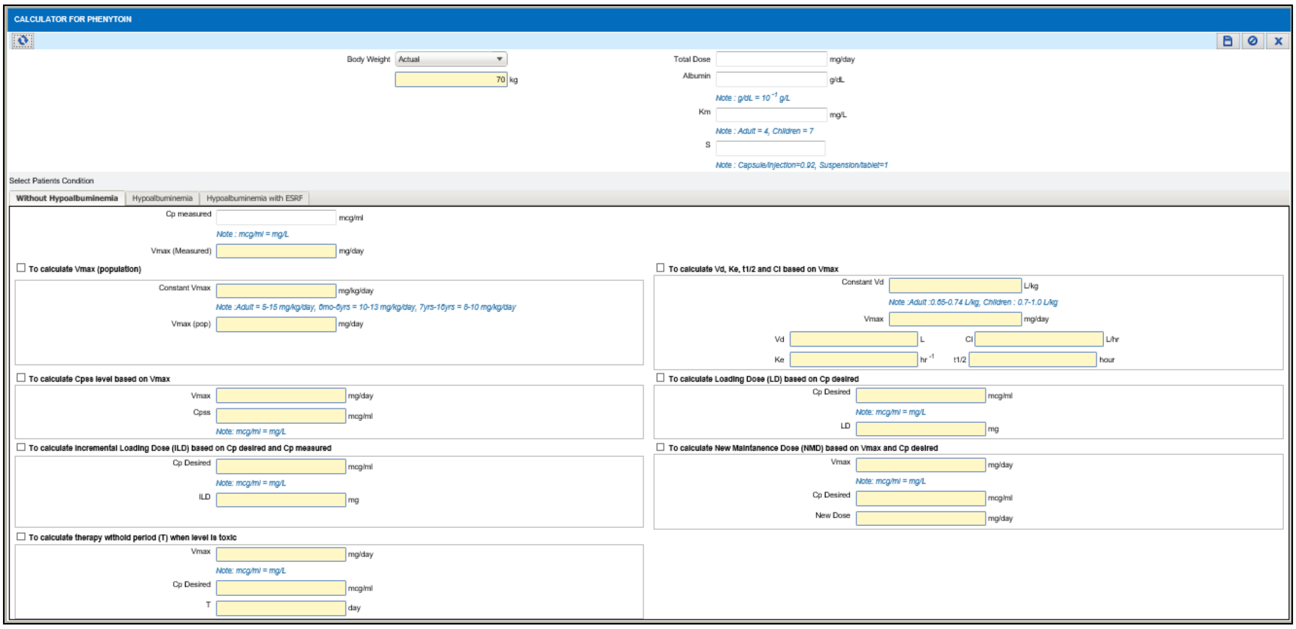


Figure 10.0-2 Calculator for Phenytoin for Drug Phenytoin

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***		