PHASER

Pharmacogenomic Testing for Veterans

VistA/CPRS User Guide

SANFORD imagenetics

Version 4.0

Revised February 2020

Contents

Introduction

This document describes the process for ordering the PHASER pharmacogenomics (PGx) lab test, ordering an Interfacility Consult (IFC, aka PHASER E-consult), the Postings feature, and other aspects of PHASER you will find useful. The terms *PGX lab test*, *PHASER test*, and *pharmacogenomic test* are used interchangeably.

The PGx lab test analyzes inherited genetic differences in drug metabolic pathways to see how an individual may respond to drugs, both in terms of therapeutic and adverse effects. PHASER pharmacogenomic Testing for Veterans is a collaboration between the Veterans Health Administration and Sanford Health Care in Sioux Falls, South Dakota, that implements PGx testing to provide preemptive testing for Veterans at no cost. This collaboration is funded entirely through a generous donation from Denny Sanford and Sanford Health.

The test is a simple blood panel that analyzes a select number of genes that affect metabolism and transport of commonly prescribed medications for mental health, pain, and cardiometabolic diseases. By analyzing a patient's genes, physicians can see how certain medicines will interact with that patient, allowing them to make better informed decisions on the amount of the medication to prescribe or if a different medication would be more appropriate.

This testing is preemptive, which means a patient may not need any medication at the time of testing. Instead, this test provides helpful information to include in their electronic health records, so should the need arise in the future, this information will be readily available to their healthcare professionals.

Document History

If you have questions or feedback about this document please contact Mike Naglich at michael.naglich@va.gov, phone 919-286-0411 x-179945.

Date	Revision	Author	Comment
19-12-05	Version 3	M.Naglich	Add Postings information.
20-02-12	Version 4	M.Naglich	Final version with 11-gene updates.

Changes in This Version

The PHASER CPRS reminder dialog has been updated to reflect Sanford Health Lab's upgrade from an 8-gene to an 11-gene pharmacogenomic test. Additional usability changes were made at the recommendation of the VHA Human Factors Engineering team.

Availability of the 11-gene test does not mean people need to be retested if they have already received the 8-gene test. Here is a statement from Dr. Deepak Voora, MD, the PHASER National Program Director, regarding the new test and how it applies to patients who were previously tested.

Statement from Dr. Deepak Voora MD

"The new medicines that are included in the 11-gene panel are interferon/ribavirin that are used to treat chronic hepatitis C infections, although they are not first-line agents. The variants impact the efficacy of this therapy and do not impact toxicity. Therefore, these medicines are not standard of care and do not impact medication safety. One additional gene on the new panel affects warfarin, but its contribution is marginal compared to the existing genes on the panel. For these reasons, we do not recommend *routine* re-testing using the 11-gene panel for PHASER patients who were originally tested on the 8-gene panel. However, for selected patients where PGx information would impact therapeutic decision making around interferon/ribavirin for hepatitis C it is reasonable to retest using the 11-gene panel."

YouTube Videos

The following related videos are available on the PHASER YouTube channel. The **How to Order PHASER PGx Testing** video is an example of ordering the test in VistA/CPRS. There are more resources, including a Provider Quick Guide, on the PHASER SharePoint site at tinyurl.com/PHASER-provider-SharePoint.

Topic	Length (min:sec)	Link
An Introduction to the PHASER Program	5:13	https://www.youtube.com/watch?v=hTPwAaVvjJ4
How to Order PHASER PGx Testing	3:51	https://www.youtube.com/watch?v=X8SeVUVwZos
Interpreting Your Patient's PGx Test Results	8:03	https://www.youtube.com/watch?v=ZmRbhC1_cto
PHASER PGx Test Information	5:03	https://www.youtube.com/watch?v=bR64Kxuz4dg
Talking with Your Patients About PGx Testing	5:55	https://www.youtube.com/watch?v=L3PhcO8W1vM
The Science of Pharmacogenomics (PGx)	5:24	https://www.youtube.com/watch?v=jRodW_juxqA

PGx Lab Ordering Scenarios in CPRS

All providers who have been educated on the PHASER program can consent patients and order the lab test. Education is provided through in-service presentations, the YouTube videos described above, and TMS module VA 4527522 'PHASER for Physicians.' No other special setup or authorization in VistA/CPRS is required. This section describes standard scenarios that providers are likely to encounter in an outpatient setting.

A unique feature of pharmacogenomic testing is the imperative to document informed, oral, patient consent. This requirement is based on the ethical foundations for shared decision-making and patient-centered care and codified in VHA regulations. Every scenario that involves ordering the PHASER test starts with either obtaining, or verifying the existence of, documented patient consent for the test.

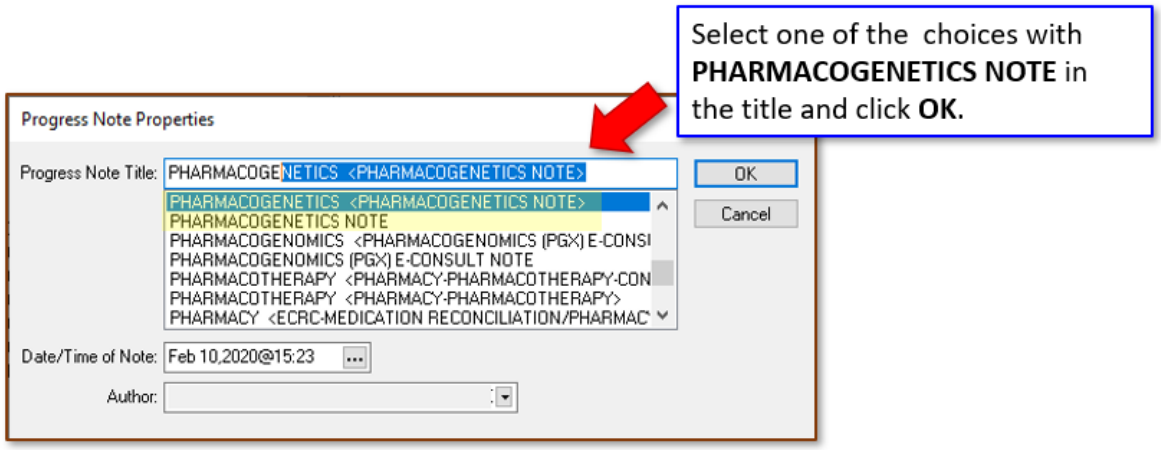
A special note titled **PHARMACOGENETICS NOTE** is defined in VistA/CPRS to standardize the process of documenting patient consent and ordering the lab test. A reminder dialog is attached to that note title. It guides you through both the consent and order steps. It also recognizes if patient consent for the test was obtained during a previous visit and will not prompt you to repeat that step.

Patient Gives Consent and the PGx Test is Ordered

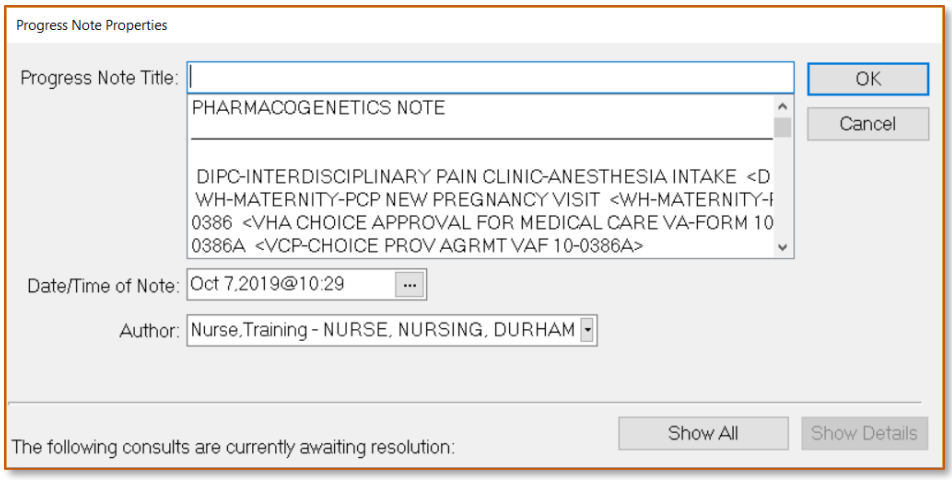
The following steps assume you want to obtain consent and order the lab test for a patient being approached for PGx testing for the first time.

1. Select a patient and visit in CPRS.
2. Navigate to the **Notes** tab.

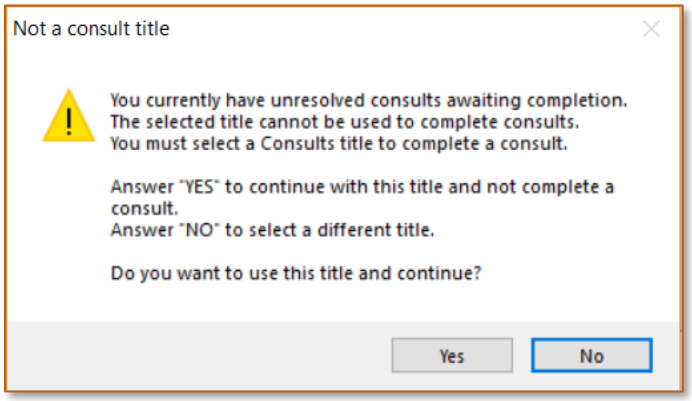
3. Click **New Note**. The Progress Note Properties dialog box appears. Start typing the string '*pharmacogenetics*' into the search box until the PGx note title appears as shown below, then click **OK** to continue.



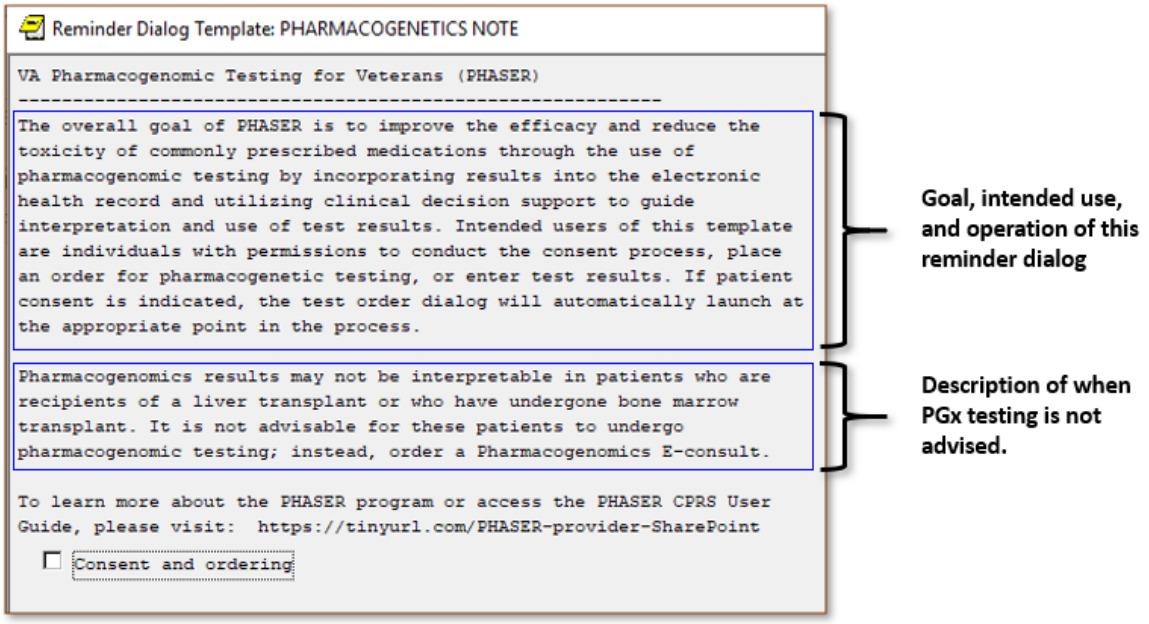
Note: This is a different example that shows a situation in which PHARMACOGENETICS NOTE was established as a favorite progress note title. See **Appendix A – Make PHARMACOGENETICS NOTE a Favorite** on page 14 for the steps to establish it as a note title favorites that always appears at the top of the list.



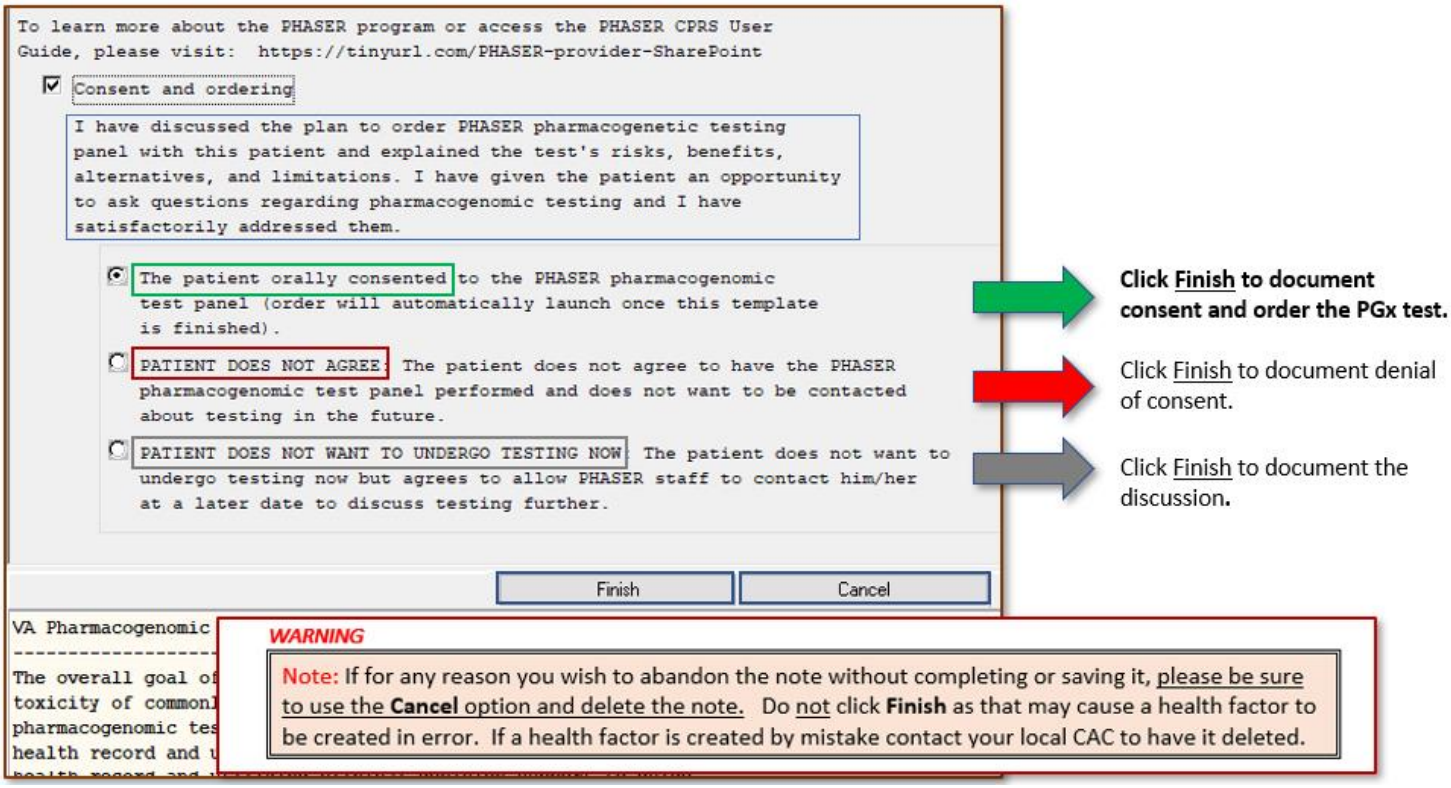
4. Choose the PHARMACOGENETICS NOTE title and click **OK**. If you receive this warning message click **Yes** to continue.



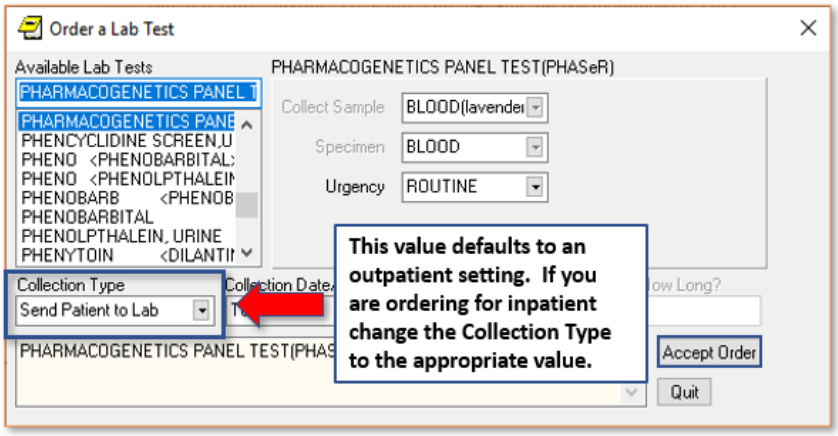
5. The PGx reminder dialog appears as shown below. It describes the reminder dialog and the 2 situations in which pharmacogenomic testing may not be advisable.



6. Check **Consent and Ordering** to process After discussing the test with the patient, click the appropriate radio button to document their decision and click **Finish** to continue. In this example the patient consents to have the test performed. When you click **Finish** the VistA/CPRS PGx quick order screen will be displayed as shown in the next step.



7. The PGx lab quick order dialog is diplayed. Defaults are set for an outpatient environment. You can change them if they are not appropriate for your clinical setting. Click **Accept Order** to continue.

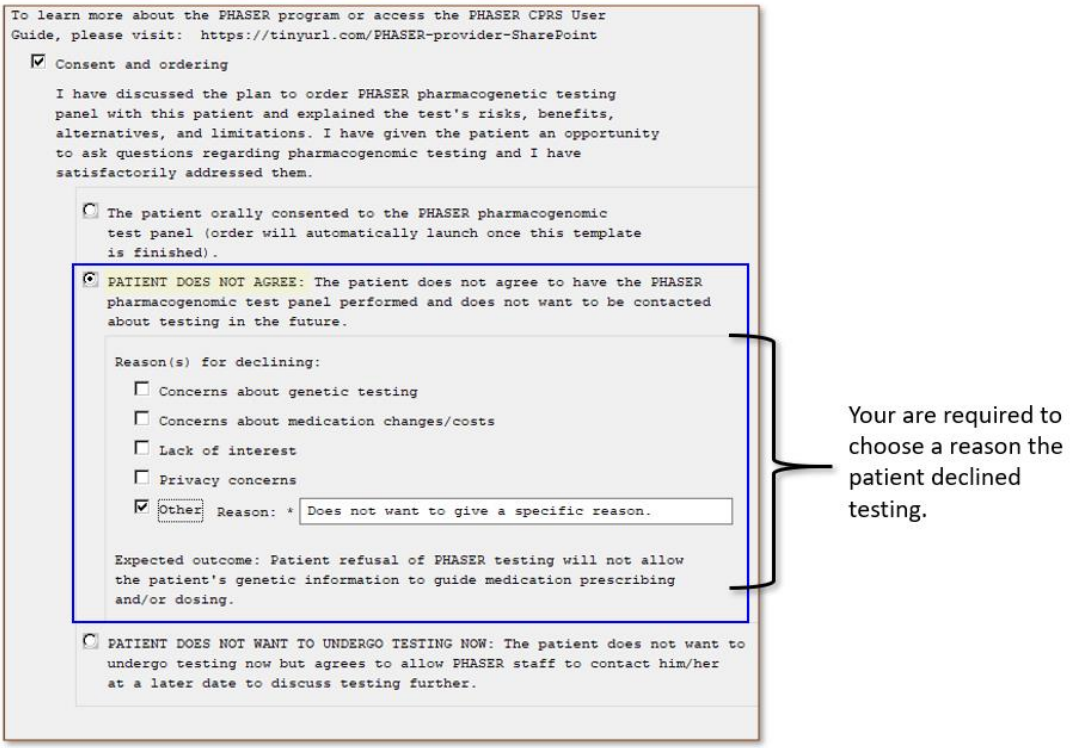


8. The **Order a Lab Test** dialog disappears. Sign the PHARMACOGENETICS NOTE and lab order in the usual way to complete the process.

Patient Denies Consent for PGx Testing

The following steps assume you want to obtain consent and order the lab test for a patient being approached for PGx testing for the first time.

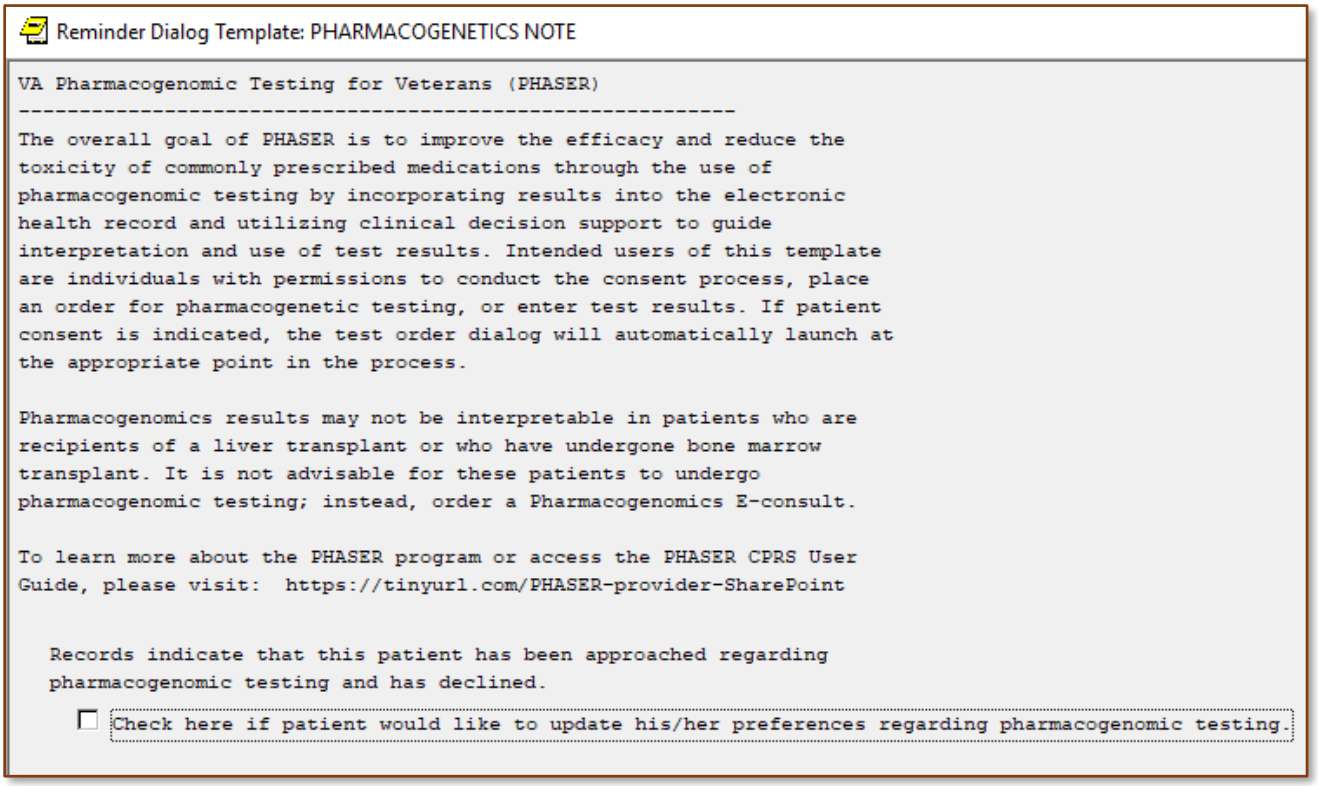
1. Select a patient and visit in CPRS.
2. Navigate to the **Notes** tab, and repeat Steps (3) through (6) listed above in Patient Gives Consent and the PGx Test is Ordered on page 4.
3. Select the radio button for **PATIENT DOES NOT AGREE**. A list of choices is displayed. Choose all that apply. You can also enter a freeform-text reason. Click **Finish** to proceed and sign your note.



Patient Changes Their Consent Decision

The following steps assume you want to obtain consent and order the lab test for a patient being approached for PGx testing for the first time.

1. Select a patient and visit in CPRS.
2. Navigate to the **Notes** tab, and repeat Steps (3) through (6) as shown above in Patient Gives Consent and the PGx Test is Ordered on page 4.
3. If the patient previously denied consent the reminder dialog will display this text. Check the radio box and the dialog will enable a new consent decision to be documented.

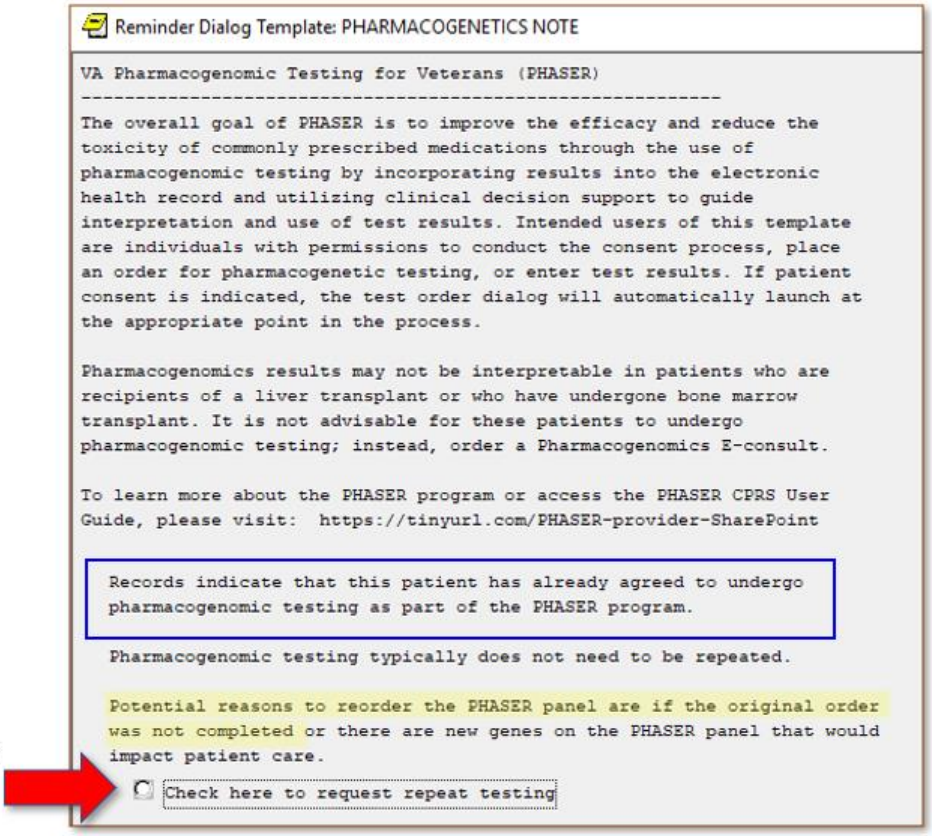


Reordering the PGx Lab Test

The PGx lab test must be ordered using the reminder dialog. It cannot be ordered in the same way as a standard lab such as a CMP or HgBA1C. Follow these steps if, for some reason, you need to reorder the PGx lab test a second time for a patient who has already given their consent for testing.

1. Select a patient and visit in CPRS.
2. Navigate to the **Notes** tab, and repeat Steps (3) through (6) as shown above in Patient Gives Consent and the PGx Test is Ordered on page 4.
3. Since the patient previously gave consent you will see this message when the reminder dialog appears. Check the radio box and proceed as if consenting the patient for the first time. The lab quick order menu will appear automatically when you click the **Finish** button.

Check this radio button to reorder the lab test.



What Happens After the Test is Ordered?

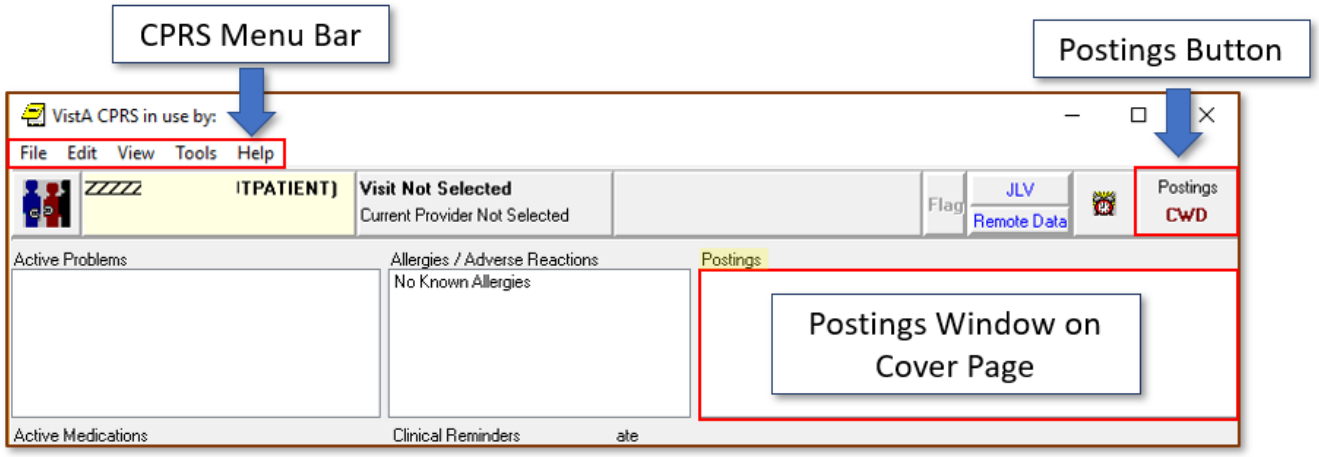
Here is what to expect after placing your first PHASER PGx lab order. Examples of the PGx results report, post-test patient brochure are on the PHASER SharePoint site at tinyurl.com/PHASER-provider-SharePoint.

1. Within 2 days the blood sample is shipped to the Sanford Health Lab in Sioux Falls, SD.
2. Within a week to 10 days, Sanford Health will process the specimen and return the test results to your location in a PDF file. The file is sent to a person at your site designated to receive and process it.
3. The person responsible for processing PGx test results at your location will arrange for the following tasks to be completed within 2 weeks of the receipt of test results.
    a. A copy of the original PDF will be loaded into VistA Imaging.
    b. They will create a CPRS progress note summarizing the results. You will be made an additional signer for the progress note.
    c. A copy of the results, along with a post-test brochure, will be mailed to the patient. You can find a copy of this brochure on the PHASER SharePoint site in the **Site Startup / Veteran Education** folder.
4. After placing your first PGx order you are added to the PHASER-L listserv and will periodically receive information to help you apply PGx results in your clinical process.

Introduction to VistA/CPRS Postings

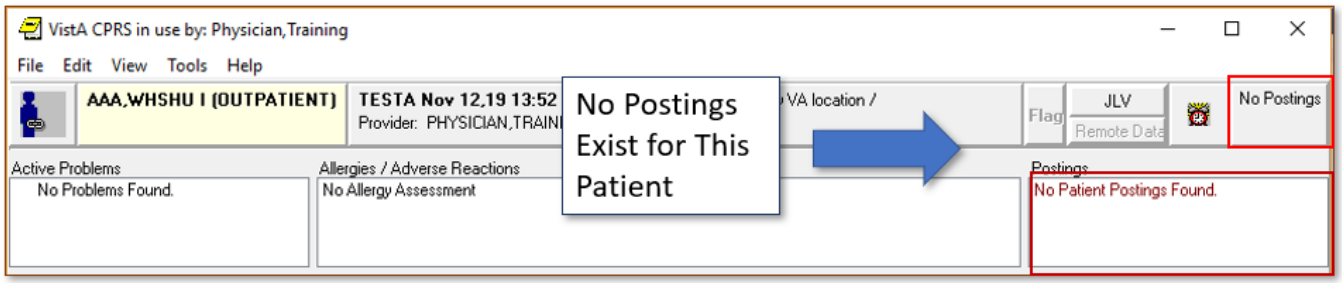
Note: Not all PHASER locations choose to implement this feature of PHASER. If you are not sure if it has been implemented at your location contact your local Computer Applications Coordinator (CAC) or your PHASER Site Champion or Site Coordinator. If the feature has not been implemented but you feel it would be helpful, contact your Site Champion and request it.

VistA/CPRS has a feature referred to as a **Posting** that is available from any tab in the CPRS Graphical User Interface (GUI). Postings contain important patient-related information. The Postings button is visible on all tabs of the CPRS GUI window and is always located in the upper right corner of the window. There is also a Postings window on the CPRS cover page as shown below.

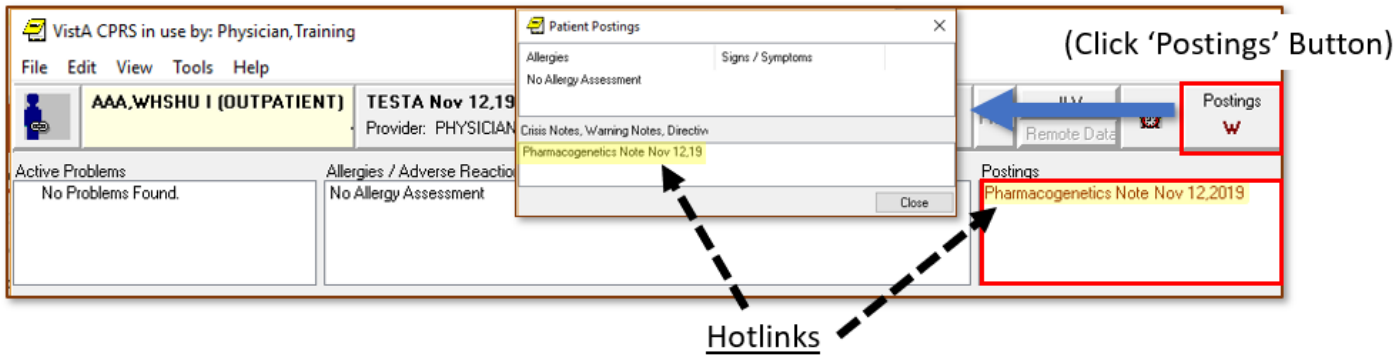


A Posting message serves as a hotlink to related clinical information. For example, as explained in a following section, if you click the PHASER Posting message "*Pharmacogenetics Note*" the related PGx progress note with test results is automatically displayed.

A PHASER Posting is automatically created when a progress note with the title PHARMACOGENETICS NOTE is created. For example, this is what happens when a patient with no Postings has their consent for PGx testing documented in CPRS using the PHASER reminder dialog. View this YouTube video for an example of how the reminder dialog works.



Once Consent is documented in a note titled PHARMACOGENETICS NOTE these Posting will appear. Note: you may need to use the CPRS Refresh function or switch patients to see the change. Clicking on the Posting text, which is highlighted in the figure below, takes you directly to the related progress note.

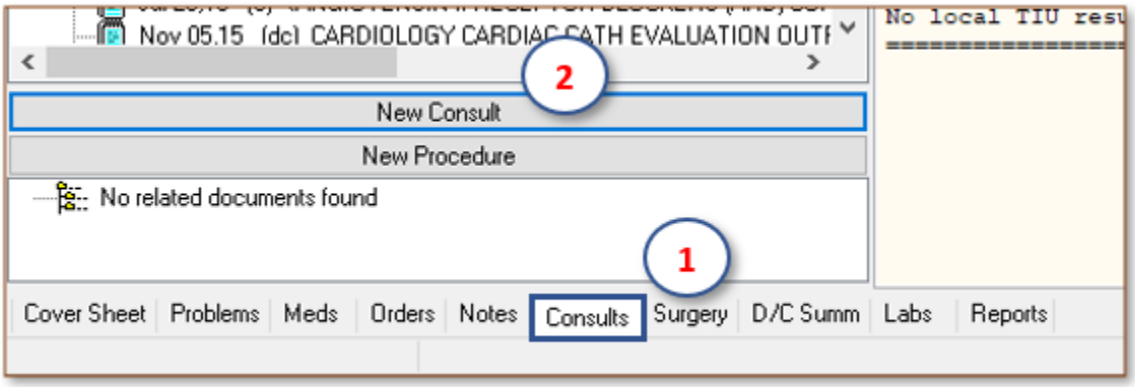


Once a Posting is created VistA automatically tracks the most recent related clinical note. For example, in the scenario described above clicking one of the highlighted hotlinks will display the PHARMACOGENTIC NOTE you created to document patient consent. However, once PGx test results are entered in CPRS clicking on the same link will automatically display the most recent note with test results.

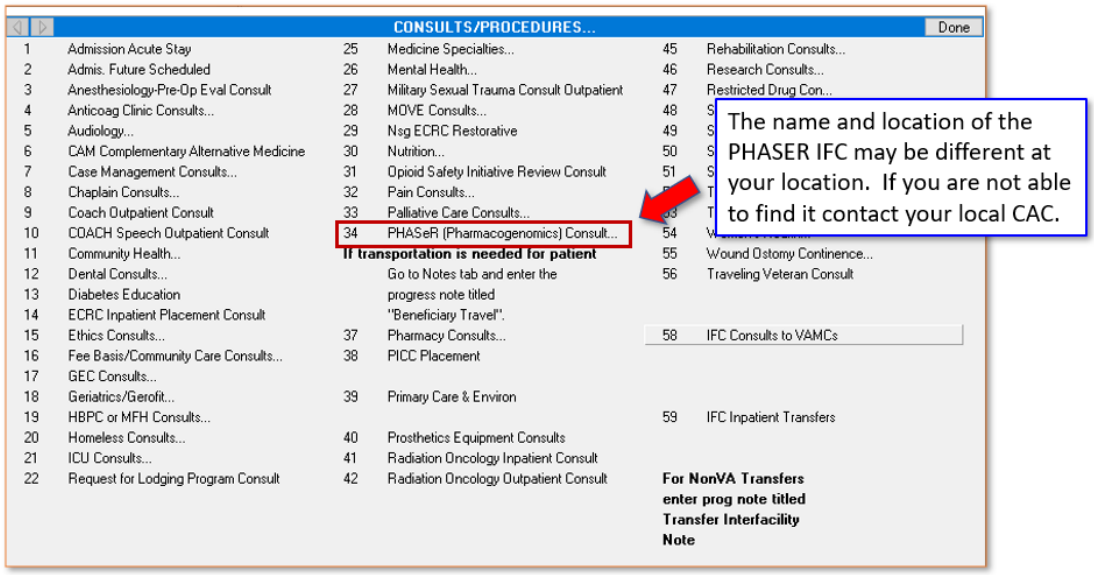
PHASER Interfacility Consult (IFC)

This consult feature is available at PHASER locations to assist clinicians with interpretation and clinical application of PGx test results by providing a PGx Pharmacy Interfacility Consult (IFC) service in VistA/CPRS. This provider-to-provider e-consult will request an interpretation of any existing pharmacogenomic testing performed to date, whether through PHASER or another laboratory. Follow these steps to initiate a PHASER IFC. A

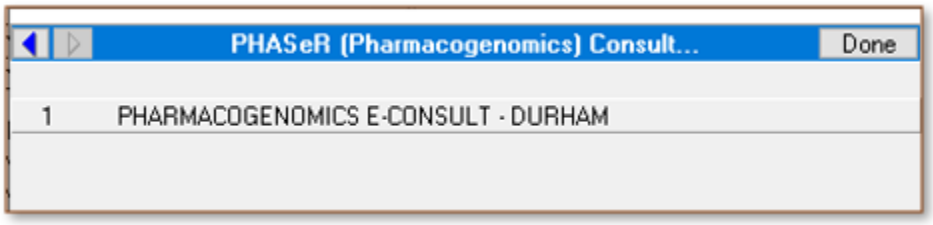
1. Select the patient, provider, and encounter in VistA/CPRS.
2. Select the **Consults** tab and click **New Consult**.



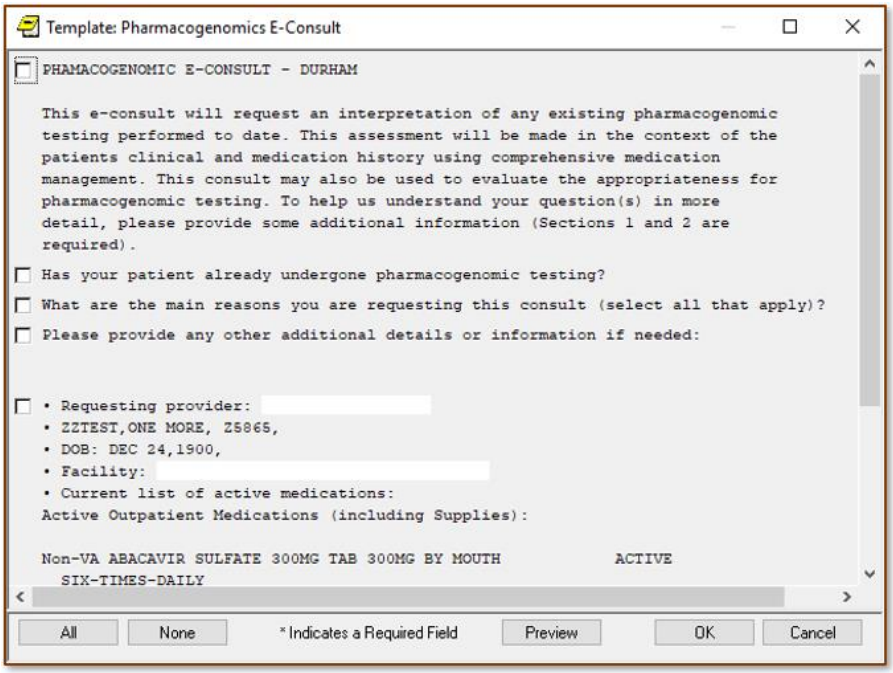
3. Choose the **PHASER (Pharmacogenomics) Consult** menu option.



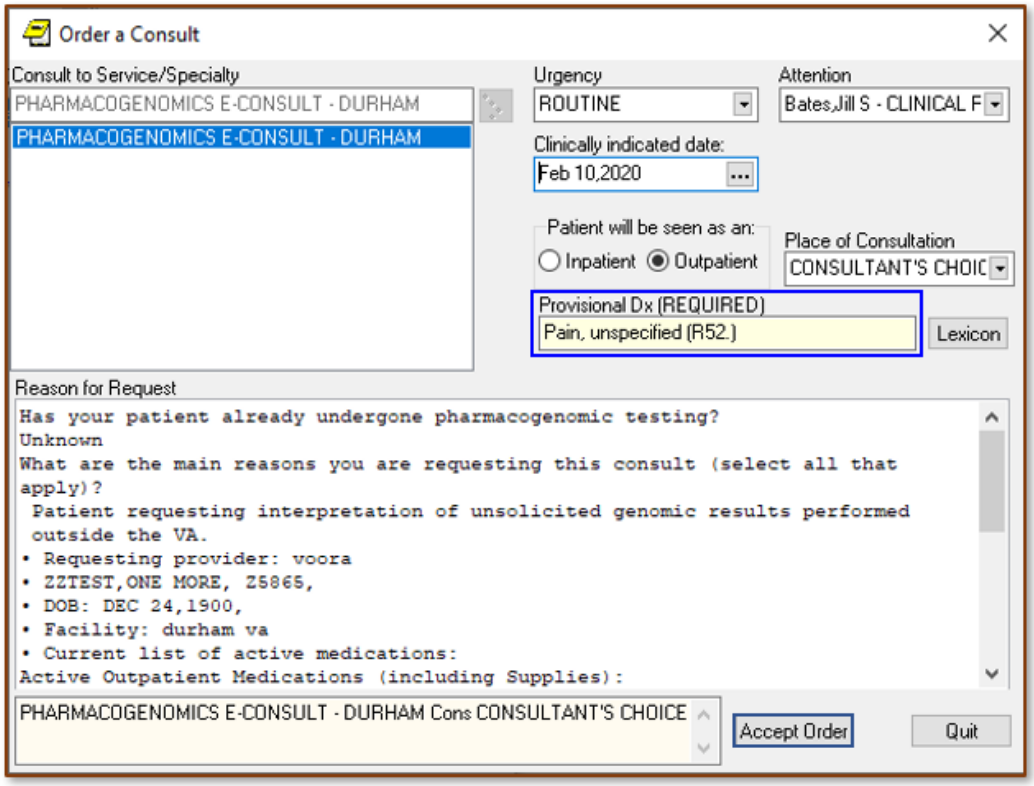
4. At the Durham VA, another menu appears. Your location will be different. Click **PHARMACOGENOMICS E-CONSULT – DURHAM** to proceed.



5. The E-Consult template is displayed. Follow the prompts and provide information that will be included with your consult. Click **OK** when you are finished.



6. The Order a Consult dialog appears. A provisional diagnosis is required. Click **Accept Order** to submit your request. The amount of time it takes for the request to be release at one VA location and received at the Durham VA for processing varies, but you should receive a response within 5 business days. If you have questions about the status of your request please contact Jill Bates, Pharm.D., M.S., BCOP, FASHP, the PHASER Pharmacy Program Manager at (919) 286-0411 ext. 172213 or by email at Jill.bates@va.gov.



Appendix A – Make PHARMACOGENETICS NOTE a Favorite in CPRS

When you navigate to the CPRS **Notes** tab and click **New Note,** the Progress Note Properties dialog box appears as shown below. You can designate which notes appear as favorites, eliminating the need to search for them. This example shows that PHARMACOGENETICS NOTE has been made a favorite.

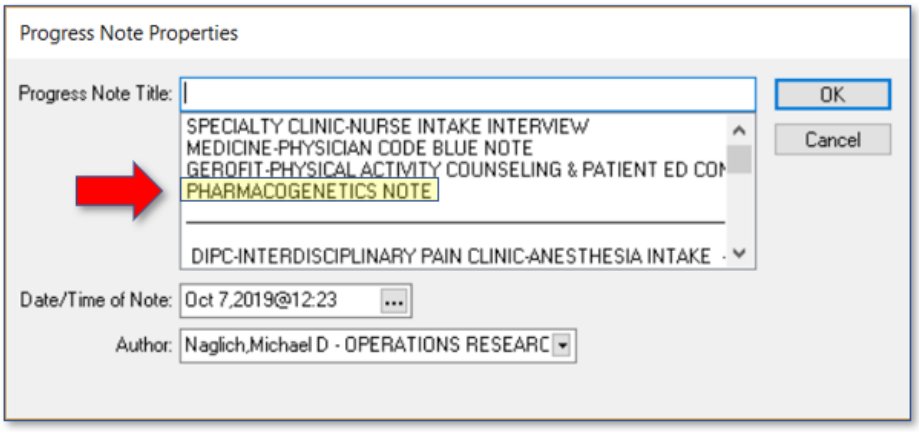
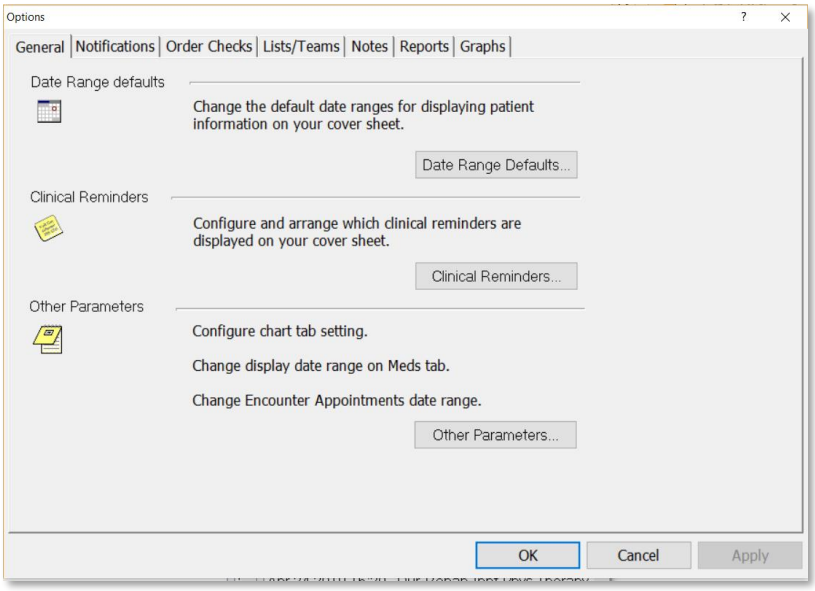


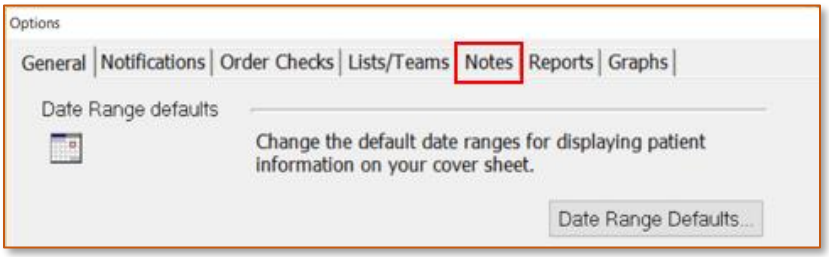
Figure 1 - PHARMACOGENETICS NOTE set as a favorite for a New Note.

Follow these steps to make PHARMACOGENTICS NOTE one of your favorites.

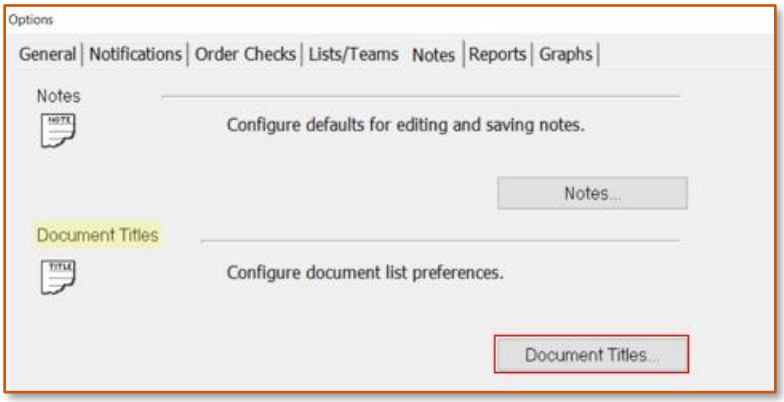
1. In CPRS choose **Tools > Options** on the menu bar. The Options dialog box appears.



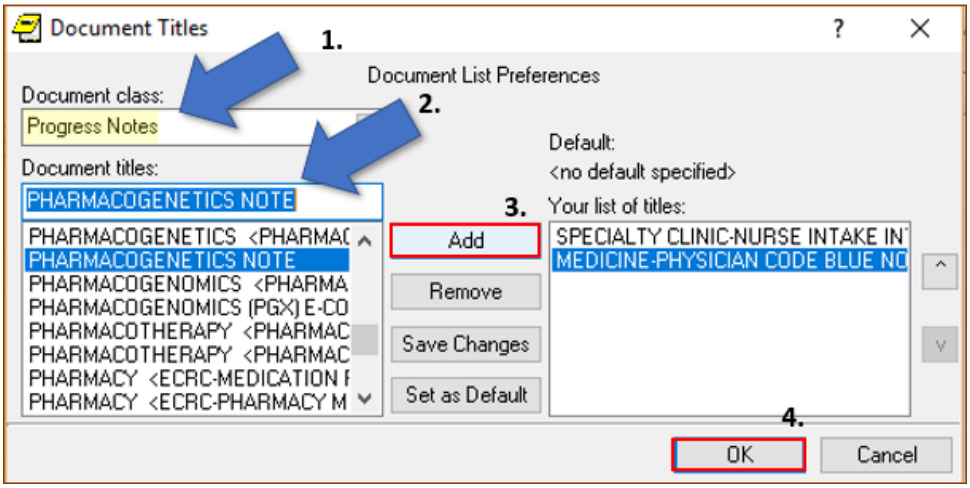
2. Select the Notes tab.



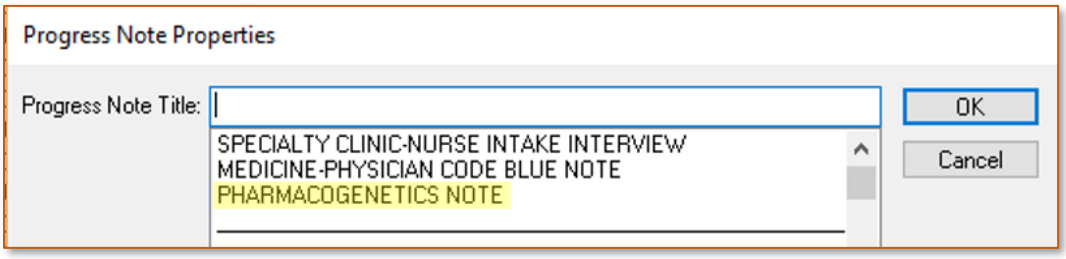
3. Click **Document Titles**. The **Document Titles** dialog box appears.



4. Do the following:
    1. Make sure the **Document Class**: field is set to **Progress Notes**.
    2. Start typing '*PHARMACOGENETICS NOTE*' in the **Document titles**: field to select that note title.
    3. Click the **Add** button. PHARMACOGENETICS NOTE should appear on the right under **Your list of titles**.
    4. Click **OK** followed by **Cancel** until you are back at the main CPRS screen.



5. Next time you navigate to the **Notes** tab and click **New Note** you will see PHARMACOGENETICS NOTE listed as a favorite. Select it from the list and the associated reminder dialog will open automatically.



Appendix B – Sample CPRS PGx Results Note

This an example of what you will see recorded in CPRS. A complete copy of the report from Sanford Health is stored in VistA Imaging. The highlighted text in this sample shows where you can find the date on which the report was loaded to VistA Imaging. See PHASER Interfacility Consult (IFC) on page 11 for information on submitting a PHASER Interfacility Consult (IFC, aka E-consult).

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VA Pharmacogenomic Testing for Veterans (PHASER)
------------------------------------------------------------
The overall goal of the PHASER program is to improve the efficacy and
reduce the toxicity of commonly prescribed medications by applying
pharmacogenomic testing to adjust medication dose and type according to
a patient's pharmacogenomic profile. Test results will be incorporated
into the electronic health record along with clinical decision support
tools to guide interpretation and appropriate use of test results.

TRANSPLANT ALERT - Pharmacogenomics results may not be interpretable in
patients who are recipients of a liver transplant or who have undergone
bone marrow transplant. It is not advisable to use PHASER test results
in such patients; instead, order a Pharmacogenomics E-consult.

A basic pharmacogenomic testing panel was performed as part of the
PHASER program. A copy of the patient-facing pharmacogenomic report
has been provided to the patient. The following gene phenotype
interpretations were identified based on the Clinical
Pharmacogenetics Implementation Consortium (CPIC) guidelines
using Translational Software.

To learn more about specific drug-gene interactions, interpreting the
report, ordering a pharmacogenomics consultation, or to review other
educational materials, please visit:
https://tinyurl.com/PHASeR-provider-SharePoint

HOW TO USE THIS INFORMATION: For medicines that are currently prescribed,
consider modifying prescription therapy if your patient is NOT
appropriately responding to therapy (i.e., lack of efficacy or side
effects) in conjunction with the patient's comorbidities and concomitant
medications. See VistA Imaging for the list of medications impacted by
the PHASER panel administered. For medicines prescribed in the future,
refer back to the patient's VistA Imaging report to consider
alternatives based on the patient's pharmacogenomics test results.
If you have any questions, please order a Pharmacogenomics E-consult.

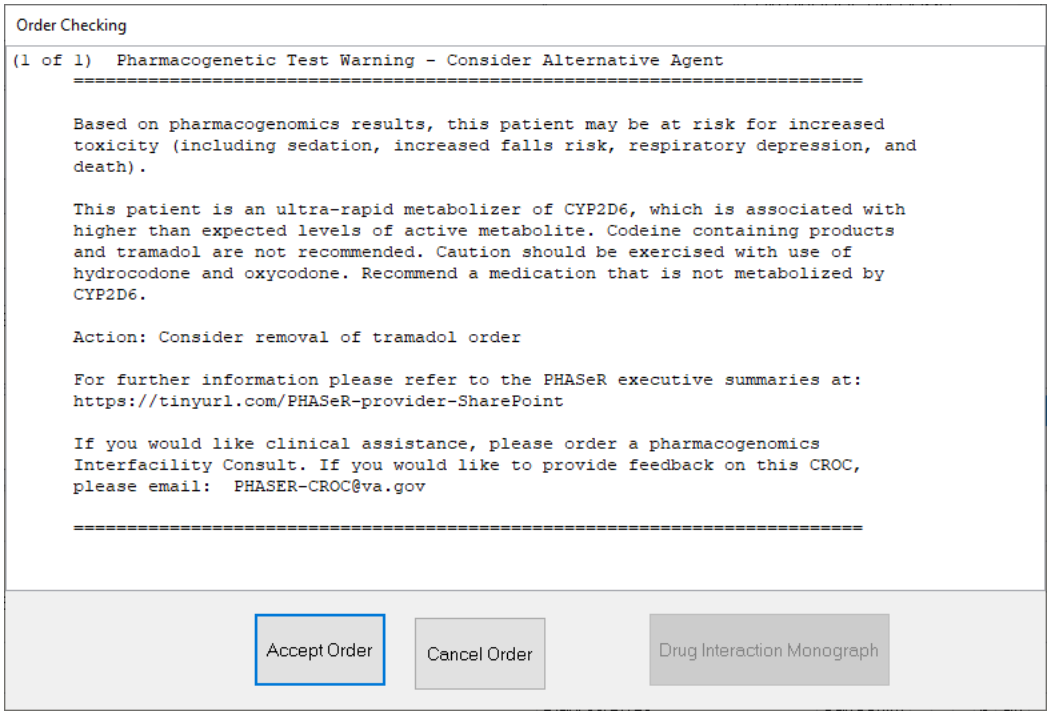
LOCATION OF FULL RESULTS REPORT: The full test results report PDF
including impacted medications, individual genotypes, and drug-gene
interactions can be found in VistA Imaging under the following
PROC DT date: Feb 10,2020

TEST RESULTS (11-GENE PANEL):
  Gene: CYP2C
    Result: Low sensitivity
  Gene: CYP2C19
    Result: Poor metabolizer
  Gene: CYP2C9
    Result: Normal metabolizer
  Gene: CYP2D6
    Result: Normal metabolizer
  Gene: CYP3A5
    Result: Normal metabolizer
  Gene: CYP4F2
    Result: Homozygous for the A allele (rs2108622)
  Gene: DPYD
    Result: Normal metabolizer
  Gene: IFNL3
    Result: Unfavorable response
  Gene: SLCO1B1
    Result: Decreased function
  Gene: TPMT
    Result: Unknown
  Gene: VKORC1
    Result: Intermediate warfarin sensitivity
```

Appendix C - Frequently Asked Questions

What is the status of clinical decision support systems (CDSS) development?

Work is underway to create a set of national CROCs— (clinical reminder order checks) which will evaluate the patient's pharmacogenetic test results during the medication ordering process within CPRS. Drug-gene interactions detected by a CROC will 1) alert the provider to the nature of the interaction (e.g., lack of efficacy or increased risk of toxicity) and 2) recommendations to alter the dose or type of medication based on the patients pharmacogenetic test results. If local sites are employing their own CDSS for drug-gene interactions, the national deployment of CROCs would replace any local tools. We anticipate CROCs will begin deployment in mid-2020 and be completed by end of 2020. A total of 28 individual CROCs are planned. CROCs will be updated over time by the PHASER program. A screen shot of the CROC in development for tramadol is below:



deactivate them.

What is the evidence base supporting PHASER?

Each of the drug-gene pairs included in the PHASER panel have been found by the Clinical Pharmacogenetics Implementation Consortium (CPIC) to have moderate to high levels of evidence that changing prescriptions on the basis of a patient's genetic information can improve clinical outcomes. The CPIC evidence review process evaluates a range of evidence supporting reactive pharmacogenetic testing for single drugs from prospective randomized controlled trials, retrospective substudies of randomized clinical trials, prospective, observational data, to pharmacokinetic/dynamic data. CPIC does not recommend if testing should be performed or not, however.

Medications under pharmacogenomic control are commonly prescribed in the VA with 1 in 2 Veterans exposed in a 6-year period and > 90% expected to carry an actionable allele based on population averages. Compared to a strategy of single gene testing, an analysis of a single academic medical center found that panel-based testing would lead to a 33% reduction in the total numbers of tests performed. A strategy of pre-emptive pharmacogenetic testing has not yet been evaluated in terms of clinical outcomes, so there is a lack of evidence in favor of (or against) this approach.

An interim analysis of all PHASER tests performed is planned in Spring 2020.

How can a provider know if a patient has been tested in the PHASER program?

We utilize the Postings feature in CPRS for this purpose. We ask sites to allow a "Pharmacogenetics" posting which is visible on the cover page of a patient's chart when patients agree to testing and/or when test results are returned. Clicking on the postings takes you directly to the CPRS pharmacogenetics results note.

How does the PHASER panel differ from other commercially available PGx panels?

The PHASER panel is a limited panel that covers the genes that have published CPIC guidelines and can be performed on their high-throughput genotyping instruments. Notable blind spots to their assay are HLA alleles important for abacavir or carbamazepine. Other commercial panels will typically cover the same alleles as the PHASER panel but will also include many other genes that have much lower levels of evidence and there is uncertain clinical validity and utility. Another thing that is different is that some panels, particularly those used in mental health, use a proprietary algorithm to interpret the genetic test results and provide a recommended drug therapy. In contrast the PHASER panel is very transparent in how it goes from genetic test result to interpretation (all based on published CPIC guidelines).

Are there any legal exposures for the provider who orders the PGx lab, especially if they are a specialist not involved in the patient's ongoing care?

Because PHASER is a clinical program, the PGx testing should be viewed like any other laboratory test performed in the VA. That is to say that the ordering provider may have – at least some – responsibility for the PGx test results. This is similar to the responsibility a cardiologist has when an elevated creatinine is identified on a BMP, for example, and the patient is also prescribed renally cleared medications by their primary care provider. The PHASER program is developing a series of tools to help identify drug-gene interactions systematically to reduce this burden on providers: 1) clinical decision support tools to alert providers to a drug-gene interaction and 2) surveillance systems to monitor for existing drug-gene interactions that require intervention. We anticipate these systems will be in place in 2020.

Similarly, what responsibility (if any) does a provider have to act on PGx test results? The only responsibility for a provider is to consider the PGx test results as part of their medical decision making around prescriptions. There is no requirement to blindly follow the recommendations provided by PHASER. All our provider education stresses the importance on the provider having all the relevant information required to prescribe a medication (e.g. comorbidities, concomitant medications, etc.) and that PGx is one additional piece of information to consider.

What is the rationale for ordering PGx if the provider does not have a direct interest in the medication information returned?

That is, if they don't typically prescribe the medications covered by the test why should they order it? The rationale is that 1 in 2 Veterans will be newly prescribed a medication on the PHASER panel in the coming years. By ordering the PGx panel before the need for a medication, the results can be stored in the medical record and can be referenced at the time of prescribing (when they are most needed).

Do patients need to be retested after expansion to the 11-gene panel?

The new medicines that are included in the 11-gene panel are interferon/ribavirin that are used to treat chronic hepatitis C infections, though are not first-line agents. The variants impact the efficacy of this therapy and do not impact toxicity. Therefore, these medicines are not standard of care and do not impact medication safety. One additional gene on the new panel affects warfarin, but its contribution is marginal compared to the existing genes on the panel. For these reasons, we do not recommend *routine* re-testing using the 11-gene panel for PHASER patients who were originally tested on the 8-gene panel. However, for selected patients where PGx information would impact therapeutic decision making around interferon/ribavirin for hepatitis C it is *reasonable* to retest using the 11-gene panel.

What is a provider supposed to do with medications on the panel that the patient is currently taking?

For the medicines a provider is actively managing and that are on the PHASER panel, ask yourself if your patient is getting the expected response (either efficacy or toxicity) to that medication. If you can't tell (for example clopidogrel) or aren't sure (vague symptoms) then consult with the PDF report in VistA Imaging to see if any shifts in dosing or mediation class are suggested based on the patient's genetic profile. The recommended actions may not be appropriate for your patient, of course, based on their other comorbidities and concomitant medications so provider judgement is always recommended. If, however, you and your patient are satisfied with the response (e.g. pain control from tramadol with acceptable side effect profile) there is no reason to consider changing therapy based on the patient's genetic profile.