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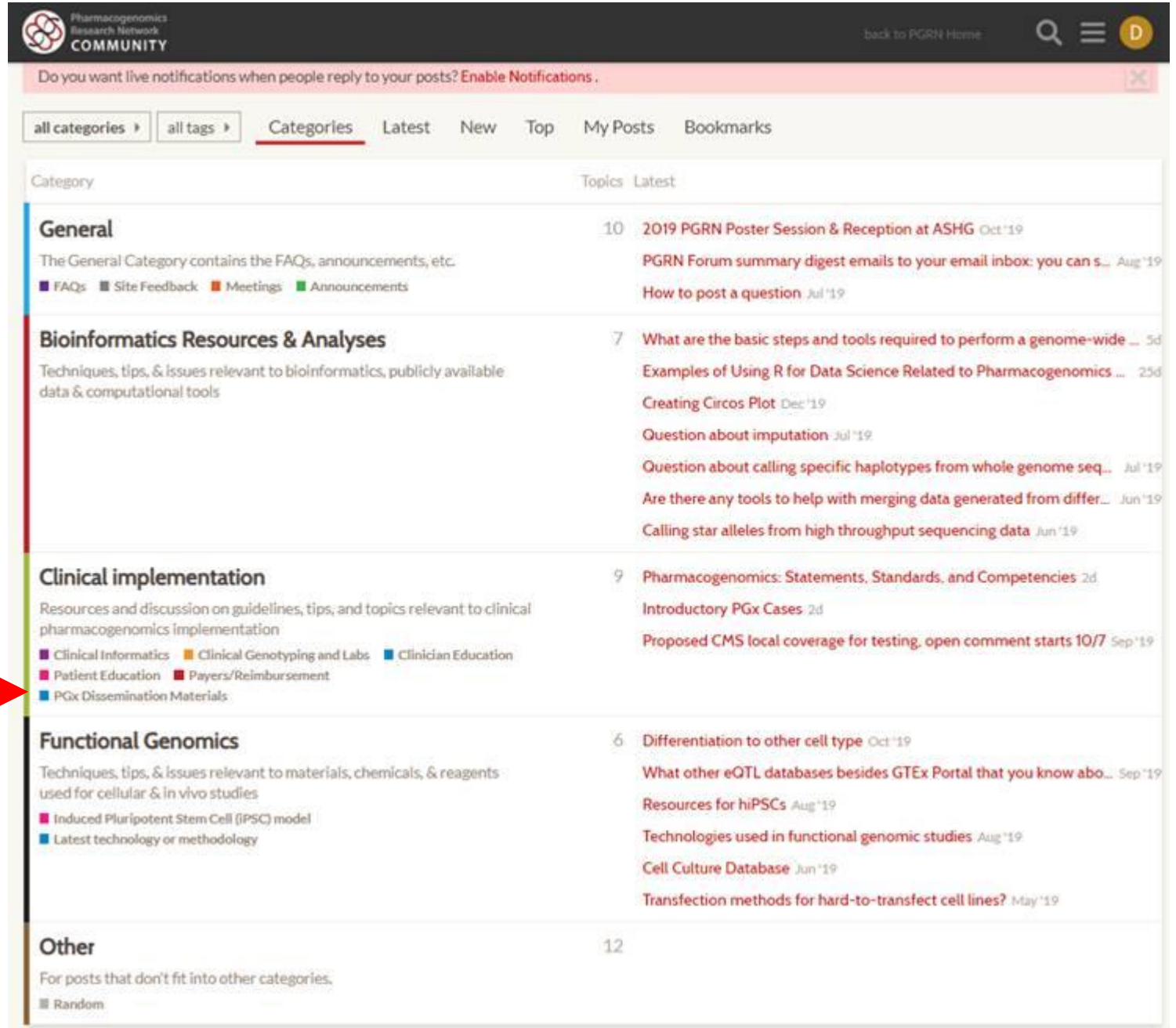

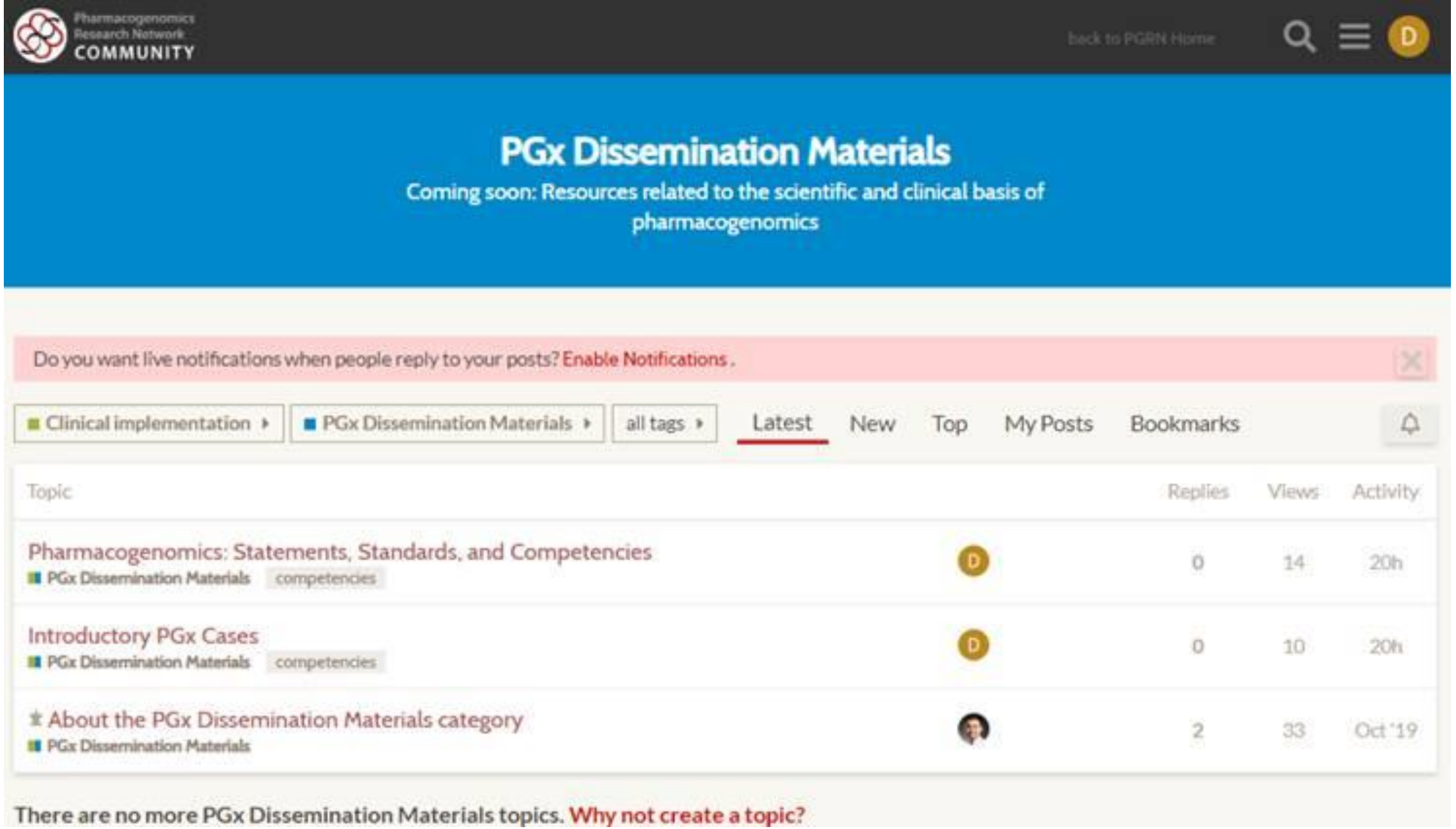

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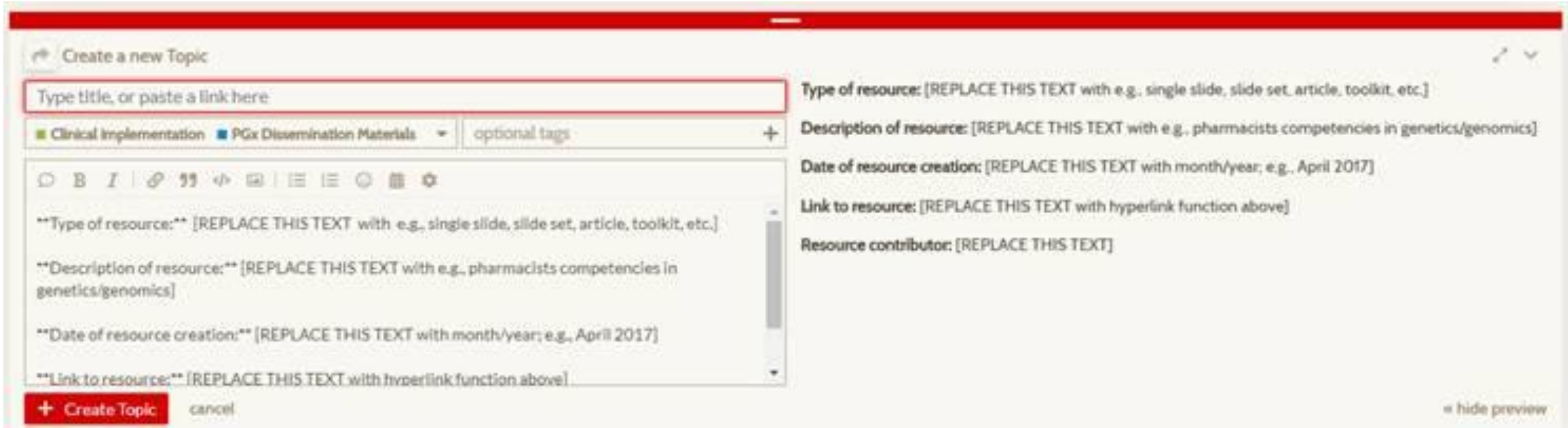
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Pharmacogenomics: Statements, Standards, and Competencies

Clinical implementation | PGx Dissemination Materials | competencies

D

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4 2d

Type of resource: Slide Set

Description of resource: Slides related to student pharmacist education standards, health care professional competencies in genetics and genomics, roles in pharmacogenomics

Date of resource creation: April 2017

Link to resource: PGx Statements Standards Competencies 1

Resource Contributor: Dave Kisor, BS, PharmD, FCP

Affiliation: Manchester University Pharmacogenomics Programs

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CPIC Informatics Working Group

- Growing interest in informatics aspects of CPIC guidelines and clinical implementation of pharmacogenetics
- Goal: To support the adoption of the CPIC guidelines by identifying, and resolving where possible, potential technical barriers to the implementation of the guidelines within a clinical electronic environment.
- Working group leaders
  - Bob Freimuth (Mayo Clinic)
  - James Hoffman (St. Jude)
  - Michelle Carrillo (Stanford)

CPIC Informatics Working Group: Initial Focus

- Create comprehensive translation tables from genotype to phenotype to clinical recommendation for CPIC guidelines
  - Define structure and process to efficiently develop and maintain in the most useful format(s)
  - Publish as part of CPIC guidelines

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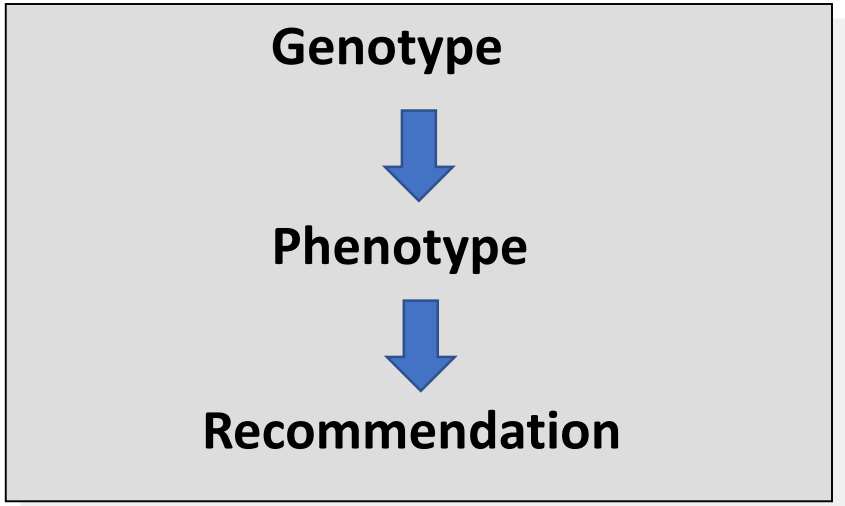
Clinical Pharmacogenetics Implementation Consortium



Official journal of the American College of Medical Genetics and Genomics **ORIGINAL RESEARCH ARTICLE** | Genetics inMedicine

Open

Standardizing terms for clinical pharmacogenetic test results: consensus terms from the Clinical Pharmacogenetics Implementation Consortium (CPIC)

Kelly E. Caudle, PharmD, PhD[1], Henry M. Dunnenberger, PharmD[2], Robert R. Freimuth, PhD[3], Josh F. Peterson, MD[4,5], Jonathan D. Burlison, PhD[1], Michelle Whirl-Carrillo, PhD[6], Stuart A. Scott, PhD[7], Heidi L. Rehm, PhD[8], Marc S. Williams, MD[9], Teri E. Klein, PhD[6], Mary V. Relling, PharmD[1], James M. Hoffman, PharmD, MS[1]

Introduction: Reporting and sharing pharmacogenetic test results across clinical laboratories and electronic health records is a crucial step toward the implementation of clinical pharmacogenetics, but allele function and phenotype terms are not standardized. Our goal was to develop terms that can be broadly applied to characterize pharmacogenetic allele function and inferred phenotypes.

Materials and methods: Terms currently used by genetic testing laboratories and in the literature were identified. The Clinical Pharmacogenetics Implementation Consortium (CPIC) used the Delphi method to obtain a consensus and agree on uniform terms among pharmacogenetic experts.

Results: Experts with diverse involvement in at least one area of pharmacogenetics (clinicians, researchers, genetic testing laboratorians, pharmacogenetics implementers, and clinical informaticians; $n = 58$) participated. After completion of five surveys, a consensus (>70%) was reached with 90% of experts agreeing to the final sets of pharmacogenetic terms.

Discussion: The proposed standardized pharmacogenetic terms will improve the understanding and interpretation of pharmacogenetic tests and reduce confusion by maintaining consistent nomenclature. These standard terms can also facilitate pharmacogenetic data sharing across diverse electronic health care record systems with clinical decision support.

Genet Med advance online publication 21 July 2016

Key Words: CPIC; nomenclature; pharmacogenetics; pharmacogenomics; terminology

SNOMED terms were not sufficiently granular to build precise CDS

CPIC has worked to submit standard terms per consensus process for addition to SNOMED and they are now available.

New SNOMED terms also enable:

- *Interoperability (e.g. phenotype will travel with patient)*
- *Sharing CDS*

Proof of concept –now scale up!

Haplotype Examples: **1, *2, *3, *17*

Diplotype Examples: *CYP2D6 (*1/*10)* or *CYP2D6 (*5/*5)*

Phenotype Example: CYP2D6 poor metabolizer

Therapeutic recommendation Example: Do not use codeine. Please select an alternative therapeutic agent.

RECEIVED 1 September 2015
REVISED 7 December 2015
ACCEPTED 13 January 2016

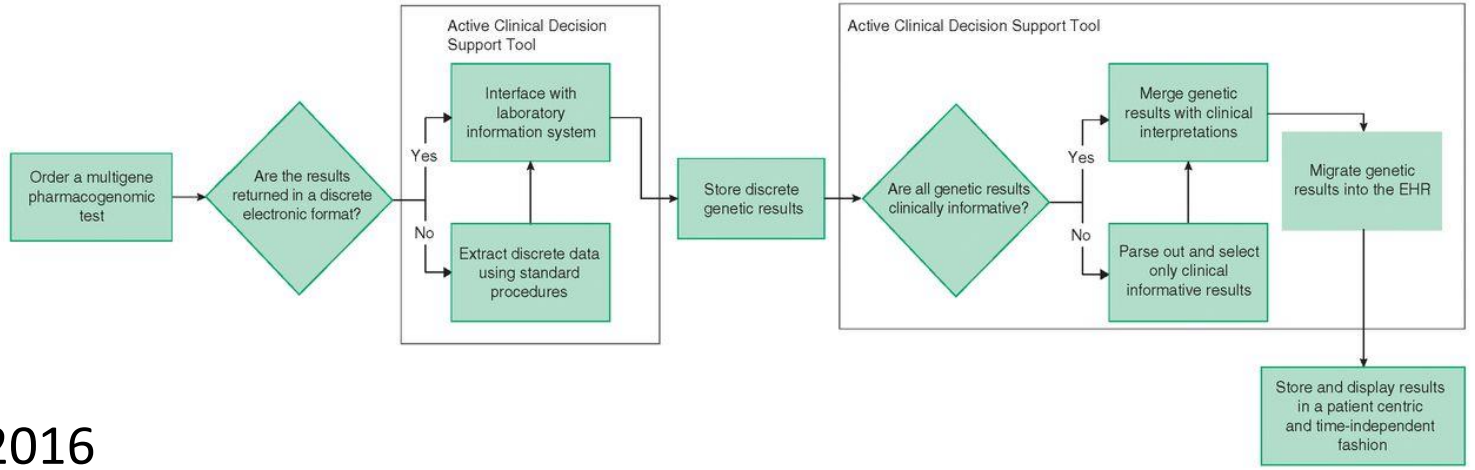
Developing knowledge resources to support precision medicine: principles from the Clinical Pharmacogenetics Implementation Consortium (CPIC)

James M. Hoffman,[1] Henry M Dunnenberger,[2] J Kevin Hicks,[3] Kelly E Caudle,[1] Michelle Whirl Carrillo,[4] Robert R Freimuth,[5] Marc S Williams,[6] Teri E Klein,[4] and Josh F Peterson[7]

ABSTRACT

To move beyond a select few genes/drugs, the successful adoption of pharmacogenomics into routine clinical care requires a curated and machine-readable database of pharmacogenomic knowledge suitable for use in an electronic health record (EHR) with clinical decision support (CDS). Recognizing that EHR vendors do not yet provide a standard set of CDS functions for pharmacogenetics, the Clinical Pharmacogenetics Implementation Consortium (CPIC) Informatics Working Group is developing and systematically incorporating a set of EHR-agnostic implementation resources into all CPIC guidelines. These resources illustrate how to integrate pharmacogenomic test results in clinical information systems with CDS to facilitate the use of patient genomic data at the point of care. Based on our collective experience creating existing CPIC resources and implementing pharmacogenomics at our practice sites, we outline principles to define the key features of future knowledge bases and discuss the importance of these knowledge resources for pharmacogenomics and ultimately precision medicine.

Keywords: pharmacogenetics, knowledge bases, electronic health records, clinical decision support systems, precision medicine



Hicks JK et al. *Am J Health-Syst Pharm 2016*
Hoffman JM et al. *J Am Med Inform Assoc.* 2016

CPIC's Five Principles for Knowledge Resources

Pharmacogenomic knowledge resources must

1. - support traceability between interrogated variants primary results, and clinical interpretations.
2. - rate level of evidence for each variant as well as for the overall recommendation
3. - use standards to facilitate information exchange and enable interoperability among disparate systems

Hoffman et al. Developing knowledge resources to support precision medicine: principles from the Clinical Pharmacogenetics Implementation Consortium (CPIC) *JAMIA* 2016

CPIC's Five Principles for Knowledge Resources

Pharmacogenomic knowledge resources must:

4. - support long-term reinterpretation of results

5. - be positioned to be integrated with other knowledge at the point of care

Hoffman et al. Developing knowledge resources to support precision medicine: principles from the Clinical Pharmacogenetics Implementation Consortium (CPIC) *JAMIA* 2016

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Clinical Pharmacogenetics Implementation Consortium

	Guideline	Sent to Rose	Rose review	allele defintion	functionality	diplotype to phenotype/consult	pre/post alerts	Sent to Rose	Rose review
2	CFTR/ivacaftor			?	n/a	mapping from Table 1	n/a	n/a	
3	CYP2C19/voriconazole	x	x	x	x	x	x	x	x
4	CYP2C19 and CYP2D6/TCA	x		x	x	x	x	x	
5	CYP2C19/SSRI	x	x	x	x	x	x	x	x
6	CYP2C19/clopidogrel	x	x	x	x	x	Does not have	Does not have	Does not have
7	CYP2B6/efavirenz	x	x	no change	x	x	x	x	
8	CYP2D6 and atomoxetine	x	x	finalizing with codier	finalizing with codier	finalizing with codiene authors	x	x	
9	CYP2D6 and codeine	x	x	finalizing with codier	finalizing with codier	finalizing with codiene authors	Does not have	Does not have	Does not have
10	CYP2D6 and ondansetron/tropisetron	x	x	finalizing with codier	finalizing with codier	finalizing with codiene authors	x	x	
11	CYP2D6 and tamoxifen	x	x	finalizing with codier	finalizing with codier	finalizing with codiene authors	x	x	
12	CYP2C9, HLA-b/Phenytoin	x	x	in progress	in progress	mapping from Table 1 for HLA	in progress		
13	warfarin guideline	??	??	??			Does not have		
14	CYP3A5/tacrolimus	x	x	x	x	x	x	x	
15	DPYD/fluoropyrimidines	x	x	x	x	x	x	x	
16	G6PD/rasburicase	x	x		need	need	need???		
17	HLA/carbamazepine/oxcarbazepine	x	x	x		mapping from Table 1	x	x	reviewing agai

Over 100 tables updated; 23 authors groups to review and approve

Table 2 Dosing recommendations for tricyclic antidepressants based on cyp2d6 phenotype

Phenotype	Implication	Therapeutic recommendation[a,b]	Classification of recommendation for amitriptyline and nortripyline[c]	Classification of recommendation for other TCAs[c,d]
CYP2D6 ultrarapid metabolizer	Increased metabolism of TCAs to less active compounds compared to normal metabolizers Lower plasma concentrations of active drug will increase probability of pharmacotherapy failure	Avoid tricyclic use due to potential lack of efficacy. Consider alternative drug not metabolized by CYP2D6. If a TCA is warranted, consider titrating to a higher target dose (compared to normal metabolizers).[e] Utilize therapeutic drug monitoring to guide dose adjustments.	Strong	Optional
CYP2D6 normal metabolizer	Normal metabolism of TCAs	Initiate therapy with recommended starting dose.[f]	Strong	Strong
CYP2D6 intermediate metabolizer	Reduced metabolism of TCAs to less active compounds compared to normal metabolizers Higher plasma concentrations of active drug will increase the probability of side effects	Consider a 25% reduction of recommended starting dose.[f] Utilize therapeutic drug monitoring to guide dose adjustments.[e]	Moderate	Optional
CYP2D6 poor metabolizer	Greatly reduced metabolism of TCAs to less active compounds compared to normal metabolizers Higher plasma concentrations of active drug will increase the probability of side effects	Avoid tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a TCA is warranted, consider a 50% reduction of recommended starting dose.[f] Utilize therapeutic drug monitoring to guide dose adjustments.[e]	Strong	Optional

CYP2C19 Diplotype	Activity Score	CYP2C19 phenotype	EHR Priority Result Notation
*24/*26	n/a	Likely CYP2C19 Poor Metabolizer	Abnormal/Priority/High Risk
*25/*35	n/a	Likely CYP2C19 Poor Metabolizer	Abnormal/Priority/High Risk
*25/*36	n/a	Likely CYP2C19 Poor Metabolizer	Abnormal/Priority/High Risk
*25/*37	n/a	Likely CYP2C19 Poor Metabolizer	Abnormal/Priority/High Risk
*26/*35	n/a	Likely CYP2C19 Poor Metabolizer	Abnormal/Priority/High Risk
*26/*36	n/a	Likely CYP2C19 Poor Metabolizer	Abnormal/Priority/High Risk
*26/*37	n/a	Likely CYP2C19 Poor Metabolizer	Abnormal/Priority/High Risk
*1/*17	n/a	CYP2C19 Rapid Metabolizer	Abnormal/Priority/High Risk
*11/*17	n/a	CYP2C19 Rapid Metabolizer	Abnormal/Priority/High Risk
*13/*17	n/a	CYP2C19 Rapid Metabolizer	Abnormal/Priority/High Risk
*15/*17	n/a	CYP2C19 Rapid Metabolizer	Abnormal/Priority/High Risk
*17/*18	n/a	CYP2C19 Rapid Metabolizer	Abnormal/Priority/High Risk
*17/*28	n/a	CYP2C19 Rapid Metabolizer	Abnormal/Priority/High Risk
*17/*17	n/a	CYP2C19 Ultrarapid Metabolizer	Abnormal/Priority/High Risk
*1/*12	n/a	Indeterminate	none
*1/*14	n/a	Indeterminate	none
*1/*23	n/a	Indeterminate	none

CYP2D6 Phenotype	Activity Score	Implications for Phenotypic Measures	Therapeutic Recommendation	Classification of Reco	Comments
CYP2D6 ultrarapid metabolizer	>2.25	Increased metabolism of tricyclic antidepre	Avoid tricyclic use due to potential lack of efficacy. Con	Strong	n/a
CYP2D6 normal metabolizer	2.25	Normal metabolism of tricyclic antidepress	Initiate therapy with recommended starting dose	Strong	Patients may receive ar
CYP2D6 normal metabolizer	2	Normal metabolism of tricyclic antidepress	Initiate therapy with recommended starting dose	Strong	Patients may receive ar
CYP2D6 normal metabolizer	1.5	Normal metabolism of tricyclic antidepress	Initiate therapy with recommended starting dose	Strong	Patients may receive ar
CYP2D6 normal metabolizer	1.25	Normal metabolism of tricyclic antidepress	Initiate therapy with recommended starting dose	Strong	Patients may receive ar
CYP2D6 intermediate metabolizer	1	Reduced metabolism of tricyclic antidepres	Consider a 25% reduction of recommended starting dos	Optional	Patients may receive ar
CYP2D6 intermediate metabolizer	0.75	Reduced metabolism of tricyclic antidepres	Consider a 25% reduction of recommended starting dos	Optional	Patients may receive ar
CYP2D6 intermediate metabolizer	0.5	Reduced metabolism of tricyclic antidepres	Consider a 25% reduction of recommended starting dos	Moderate	Patients may receive ar
CYP2D6 intermediate metabolizer	0.25	Reduced metabolism of tricyclic antidepres	Consider a 25% reduction of recommended starting dos	Moderate	Patients may receive ar
CYP2D6 poor metabolizer	0	Greatly reduced metabolism of tricyclic ant	Avoid tricyclic use due to potential for side effects. Con	Strong	Patients may receive ar
Indeterminate	n/a	n/a	No recommendation	No recommendation	n/a

CYP2C19 Phenotype	CYP2C19 Activity Score	CYP2D6 Phenotype	CYP2D6 Activity Score	CYP2C19 Implications for	CYP2D6 Impli	Therapeutic Recommendation	Classification of Recommendation	Comments
CYP2C19 intermediate	n/a	CYP2D6 intermediate metabolizer	1	Reduced me	Reducec	Consider a 25% redu	Optional	Patients may receive an initial l
CYP2C19 intermediate	n/a	CYP2D6 intermediate metabolizer	0.75	Reduced me	Reducec	Consider a 25% redu	Optional	Patients may receive an initial l
CYP2C19 intermediate	n/a	CYP2D6 intermediate metabolizer	0.5	Reduced me	Reducec	Consider a 25% redu	Optional	Patients may receive an initial l
CYP2C19 intermediate	n/a	CYP2D6 intermediate metabolizer	0.25	Reduced me	Reducec	Consider a 25% redu	Optional	Patients may receive an initial l
CYP2C19 normal metabolizer	n/a	CYP2D6 intermediate metabolizer	1	Normal meta	Reducec	Consider a 25% redu	Moderate	Patients may receive an initial l
CYP2C19 normal metabolizer	n/a	CYP2D6 intermediate metabolizer	0.75	Normal meta	Reducec	Consider a 25% redu	Moderate	Patients may receive an initial l
CYP2C19 normal metabolizer	n/a	CYP2D6 intermediate metabolizer	0.5	Normal meta	Reducec	Consider a 25% redu	Moderate	Patients may receive an initial l
CYP2C19 normal metabolizer	n/a	CYP2D6 intermediate metabolizer	0.25	Normal meta	Reducec	Consider a 25% redu	Moderate	Patients may receive an initial l
CYP2C19 poor metabolizer	n/a	CYP2D6 intermediate metabolizer	1	Greatly redu	Reducec	Avoid amitriptyline u	Optional	Dosing recommendations only a
CYP2C19 poor metabolizer	n/a	CYP2D6 intermediate metabolizer	0.75	Greatly redu	Reducec	Avoid amitriptyline u	Optional	Dosing recommendations only a
CYP2C19 poor metabolizer	n/a	CYP2D6 intermediate metabolizer	0.5	Greatly redu	Reducec	Avoid amitriptyline u	Optional	Dosing recommendations only a
CYP2C19 poor metabolizer	n/a	CYP2D6 intermediate metabolizer	0.25	Greatly redu	Reducec	Avoid amitriptyline u	Optional	Dosing recommendations only a
CYP2C19 rapid metabolizer	n/a	CYP2D6 intermediate metabolizer	1	Increased m	Reducec	Consider alternative	Optional	Dosing recommendations only a
CYP2C19 rapid metabolizer	n/a	CYP2D6 intermediate metabolizer	0.75	Increased m	Reducec	Consider alternative	Optional	Dosing recommendations only a
CYP2C19 rapid metabolizer	n/a	CYP2D6 intermediate metabolizer	0.5	Increased m	Reducec	Consider alternative	Optional	Dosing recommendations only a

The referenced substrates and cited articles are examples and may not represent all information that may be available for an allele.

GENE: CYP2C19	5/7/2019			Drug substrate	
Allele	**Allele Functional Status**	**References**	**PMID**	**in vitro**	**in vivo**
*1	Normal function	Romkes 1991	2009263		
		Richardson 1995	7487078	S-mephenytoin, tolbutamide	
		Blaisdell 2002	12464799	S-mephenytoin	
		Hanioka 2007	17455109	S-mephenytoin	
		Hanioka 2008	18312490	omeprazole	
		Wang 2011	21325430	S-mephenytoin, omeprazole	
		Takahashi 2015	25001882	clopidogrel, S-mephenytoin	
		Drögemöller 2010	20712527		
		Dodgen 2015	26244421		omeprazole
*2	No function	de Morais 1994	8195181	S-mephenytoin	
		Ibeanu 1998	9732415		S-mephenytoin
		Lee 2009	19661214		S-mephenytoin, omeprazole
		Xiao 1997	9103550		S-mephenytoin
*3	No function	de Morais 1994	7969038		S-mephenytoin
		Xiao 1997	9103550		S-mephenytoin
*4	No function	Ferguson 1998	9435198		S-mephenytoin
		Scott 2012	21358751		clopidogrel

GENE: CYP2C19							
Allele/cDNA/rsID	Activity Score (Optional)	Allele Functional Status (Optional)	Allele Clinical Functional Status (Required)	Allele Clinical Function Substrate Specificity (Optional)	PMID (Optional)	Strength of Evidence (Optional)	Findings (Optional)
*1			Normal function		2009263, 7487078, 12464799, 17455109, 18312490, 21325430, 25001882, 20712527, 26244421		2009263; 7484048: S-mephenytoin (in vitro), tolbutamide (in vitro); 124647 vitro); 17455109: S-mephenytoin (in vitro); 18312490: omeprazole (in vitro mephenytoin (in vitro), omeprazole (in vitro); 25001882: clopidogrel (in vitr vitro); 20712527; 26244421: omeprazole (in vivo)
*2			No function		8195181, 9732415, 19661214, 9103550		8195181: S-mephenytoin (in vitro); 9732415: S-mephenytoin (in vivo); 196 (in vivo), omeprazole (in vivo); 9103550: S-mephenytoin (in vivo)
*3			No function		7969038, 9103550		7969038: S-mephenytoin (in vivo); 9103550: S-mephenytoin (in vivo)
*4			No function		9435198, 21358751		9435198: S-mephenytoin (in vivo); 21358751: clopidogrel (in vivo)
*5			No function		9103550, 10022751, 21325430, 25001882		9103550: S-mephenytoin (in vivo); 10022751: S-mephenytoin (in vitro), toll 21325430: S-mephenytoin (in vitro), omeprazole (in vitro); 25001882: clopi mephenytoin (in vitro)
					9732415, 21325430,		9732415: S-mephenytoin (in vivo); 21325430: S-mephenytoin (in vitro), om

Phenotype Modifiers

Table 1 Assignment of likely TPMT and NUDT15 phenotypes based on genotypes

Likely phenotype[a]	Genotypes	Examples of diplotypes
Assignment of likely TPMT phenotypes based on genotypes		
Normal metabolizer	An individual carrying two normal function alleles	*1/*1
Intermediate metabolizer	An individual carrying one normal function allele PLUS one no function allele	*1/*2, *1/*3A, *1/*3B, *1/*3C, *1/*4
Possible intermediate metabolizer	An individual carrying one uncertain/unknown function allele PLUS one no function allele	*2/*8, *3A/*7
Poor metabolizer	An individual carrying two no function alleles	*3A/*3A, *2/*3A, *3A/*3C, *3C/*4, *2/*3C, *3A/*4
Indeterminate	An individual carrying two uncertain/unknown function alleles OR one normal function allele plus one uncertain allele function allele	*6/*8 *1/*8

GENE: SLCO1B1	2/8/2017			Drug substrate	
Allele	Allele Functional Status	References	PMID	in vitro	in vivo
*1a	Normal function	Mwinyi 2004	16568260		pravastatin
*1b	Normal function	Mwinyi 2004	16568260		pravastatin
		Kameyama 2005	15970799	pravastatin, atorvastatin, cerivastatin	
		Lee 2005	16198652		rosuvastatin
		Katz 2006	16513443	atrasentan	atrasentan
		Tirona 2001	11477075	estrone sulfate, estradiol 17beta-d-glucuronide	
*2	Possible decreased function	Tirona 2001	11477075	estrone sulfate, estradiol 17beta-d-glucuronide	
		Tirona 2003	12490595	rifampin	
*3	Possible decreased function	Tirona 2001	11477075	estrone sulfate, estradiol 17beta-d-glucuronide	

Any combination with a “possible” function translated into a “possible” phenotype

CYP2C19 phenotype	Activity Score	Genotypes	Examples of CYP2C19 diplotypes
CYP2C19 ultrarapid metabolizer	n/a	An individual carrying two increased function alleles	*17/*17
CYP2C19 rapid metabolizer	n/a	An individual carrying one normal function allele and one increased function allele	*1/*17
CYP2C19 normal metabolizer	n/a	An individual carrying two normal function alleles	*1/*1
Likely CYP2C19 intermediate metabolizer	n/a	An individual carrying one normal function allele and one decreased function allele or one increased function allele and one decreased function allele or two decreased function alleles	*1/*9, *9/*17, *9/*9
CYP2C19 intermediate metabolizer	n/a	An individual carrying one normal function allele and one no function allele or one increased function allele and one no function allele	*1/*2, *1/*3, *2/*17, *3/*17
Likely CYP2C19 poor metabolizer	n/a	An individual carrying one decreased function allele and one no function allele	*2/*9, *3/*9
CYP2C19 poor metabolizer	n/a	An individual carrying two no function alleles	*2/*2, *3/*3, *2/*3
Indeterminate	n/a	An individual carrying one or two uncertain function alleles	*1/*12, *2/*12, *12/*14

Questions

- How does your institution implement “possible” phenotypes into the EHR?
- Do the terms we use for these modifiers make sense?
- If not, what are other terms we should/could consider?

“Possible” phenotype assignment using SNOMED-CT terms

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Problem List View in EHR

Problems

Add | Modify | Convert | No Chronic Problems | Display: Active | ... | IMO

Annotated Display	Ranking	Vocabulary	Code	Classification
DPYD poor metabolizer		SNOMED CT	3532686015	Medical
G6PD - Glucose-6-phosphate dehydrogenase deficiency		SNOMED CT	1220687019	Medical
NUDT15 POOR METABOLIZER		SNODO Codes	NUDT15 POOR ...	Medical
Opioid contract exists		IMO	24288042	Medical
Opioid use agreement exists		IMO	24288036	Medical
PID 123456 SID 789456				Medical
UGT1A1 poor metabolizer		SNOMED CT	3532666019	Medical
				Medical

Problems

	Annotated Display	Ranking	Vocabulary	Code	Classification
	DPYD poor metabolizer		SNOMED CT	3532686015	Medical
	G6PD - Glucose-6-phosphate dehydrogenase deficiency		SNOMED CT	1220687019	Medical
	NUDT15 POOR METABOLIZER		SNODO Codes	NUDT15 POOR ...	Medical
	Opioid contract exists		IMO	24288042	Medical
	Opioid use agreement exists		IMO	24288036	Medical
	PID 123456 SID 789456				Medical

***Problem**

Free Text

Laterality

Responsible Provider

Display As

At: Age

***Onset:** Date

Comments

***Confirmation**

Confirmed

***Classification**

Scheduling

***Status**

Active

Cancel Reason

Ranking

Resolved At: Age

Resolved: Date

Relate Existing Problems

Show Additional Details

File to Past Medical Histo

Up Home Favorites Folders Folder: Favorites

CHAIDAR_PROBLEM

*Problem

CYP2C19 poor

Free Text

Laterality

Responsible Provider

Display As

At: Age

*Onset: Date

//****

Comments

*Confirmation

Confirmed

*Classification

Scheduling

*Status

Active

Cancel Reason

Ranking

Resolved At: Age

Resolved: Date

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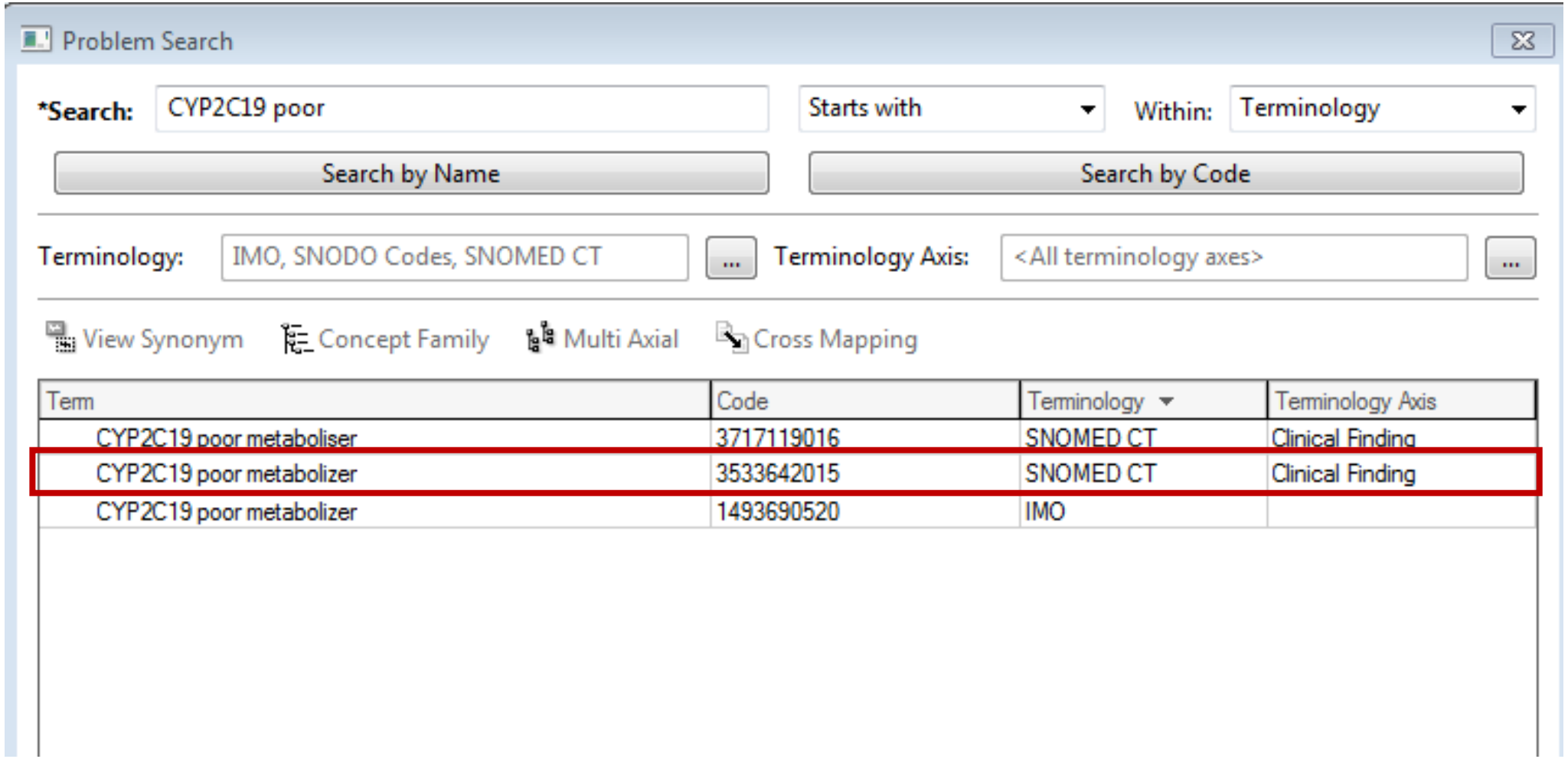
Relate Existing Problems

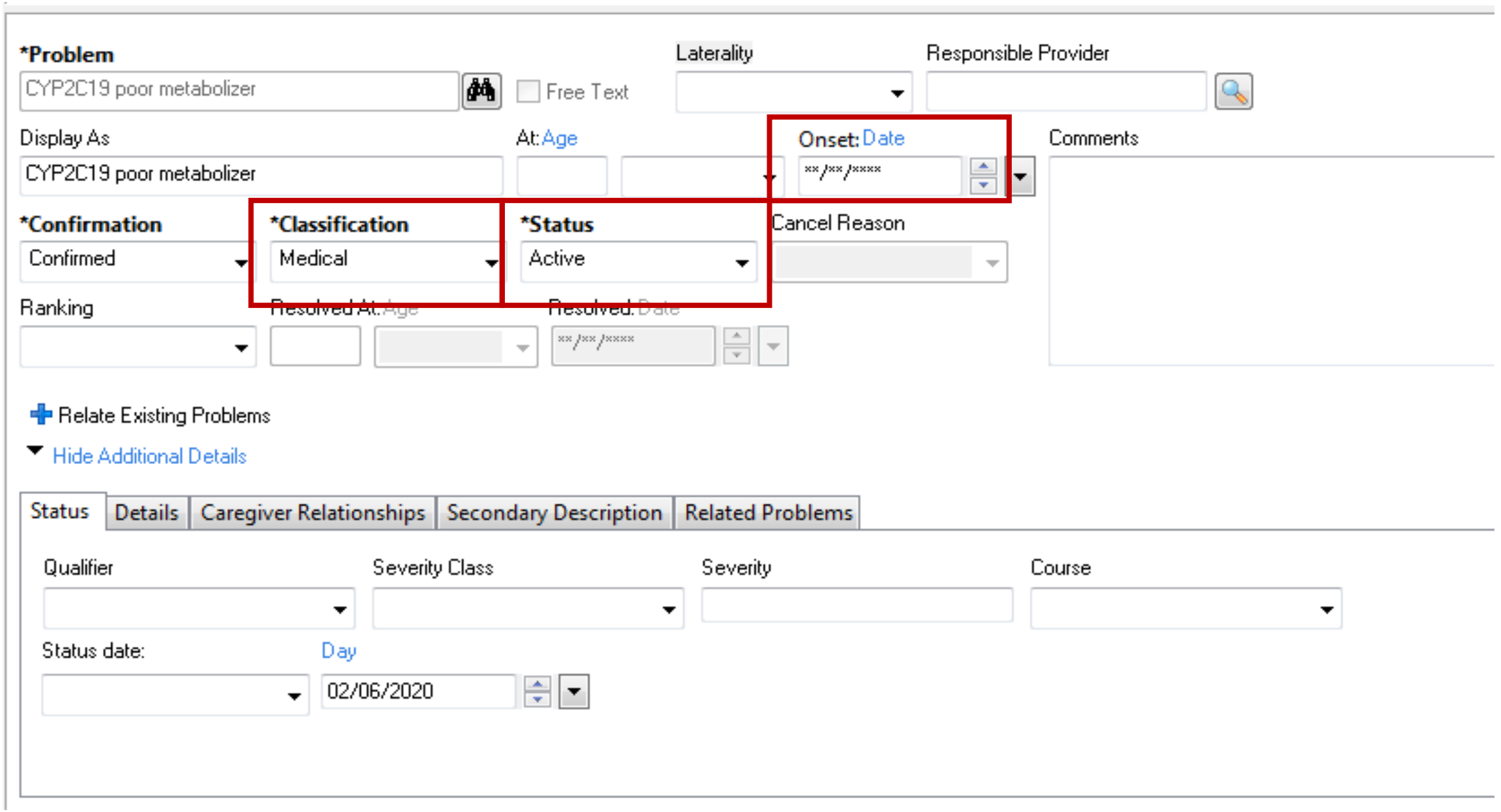
Show Additional Details

File to Pa

Up Home Favorites Folders Folder: Favorites

CYP2C19 poor metabolizer options (SNOMED CT and IMO terms)

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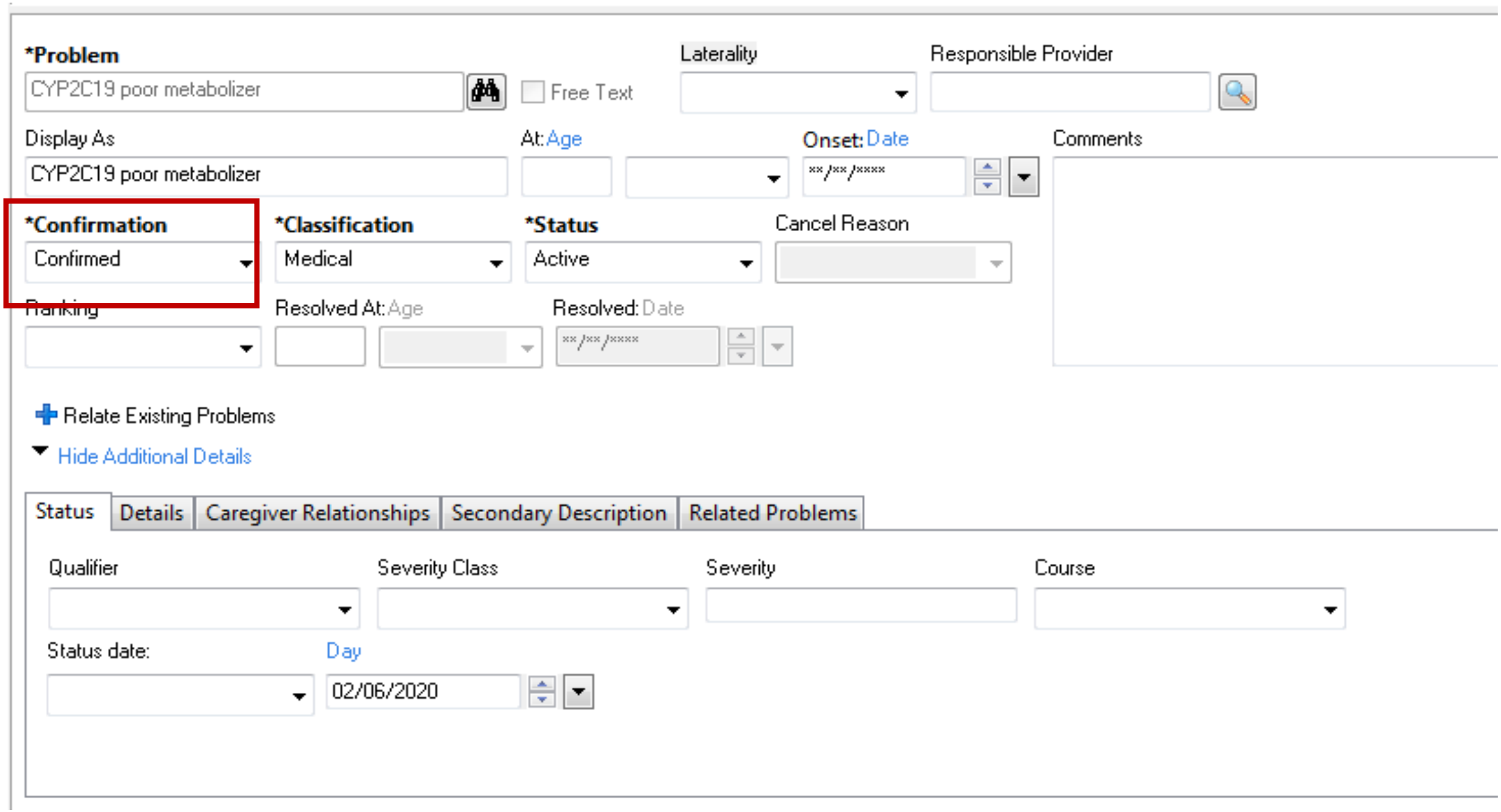
CYP2C19 poor metabolizer
Free Text
Laterality
Responsible Provider
Display As
CYP2C19 poor metabolizer
At: Age
Onset: Date
//****
Comments
*Confirmation
Confirmed
*Classification
Medical
*Status
Active
Cancel Reason
Ranking
Resolved At: Age
Resolved: Date
//****
Relate Existing Problems
Hide Additional Details
Status
Details
Caregiver Relationships
Secondary Description
Related Problems
Qualifier
Severity Class
Severity
Course
Status date:
Day
02/06/2020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Free Text
Laterality
Responsible Provider
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Secondary Description
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Severity
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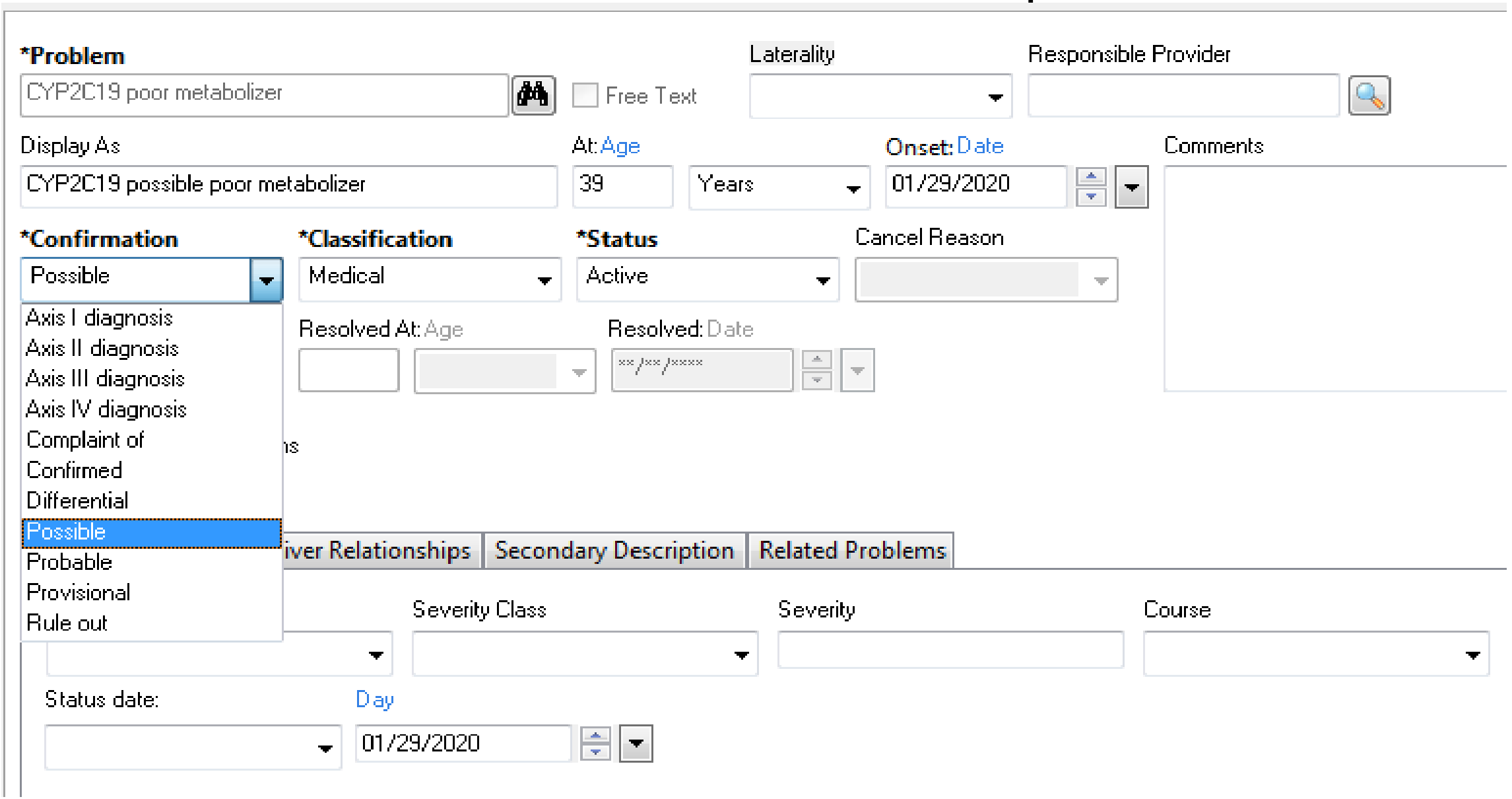
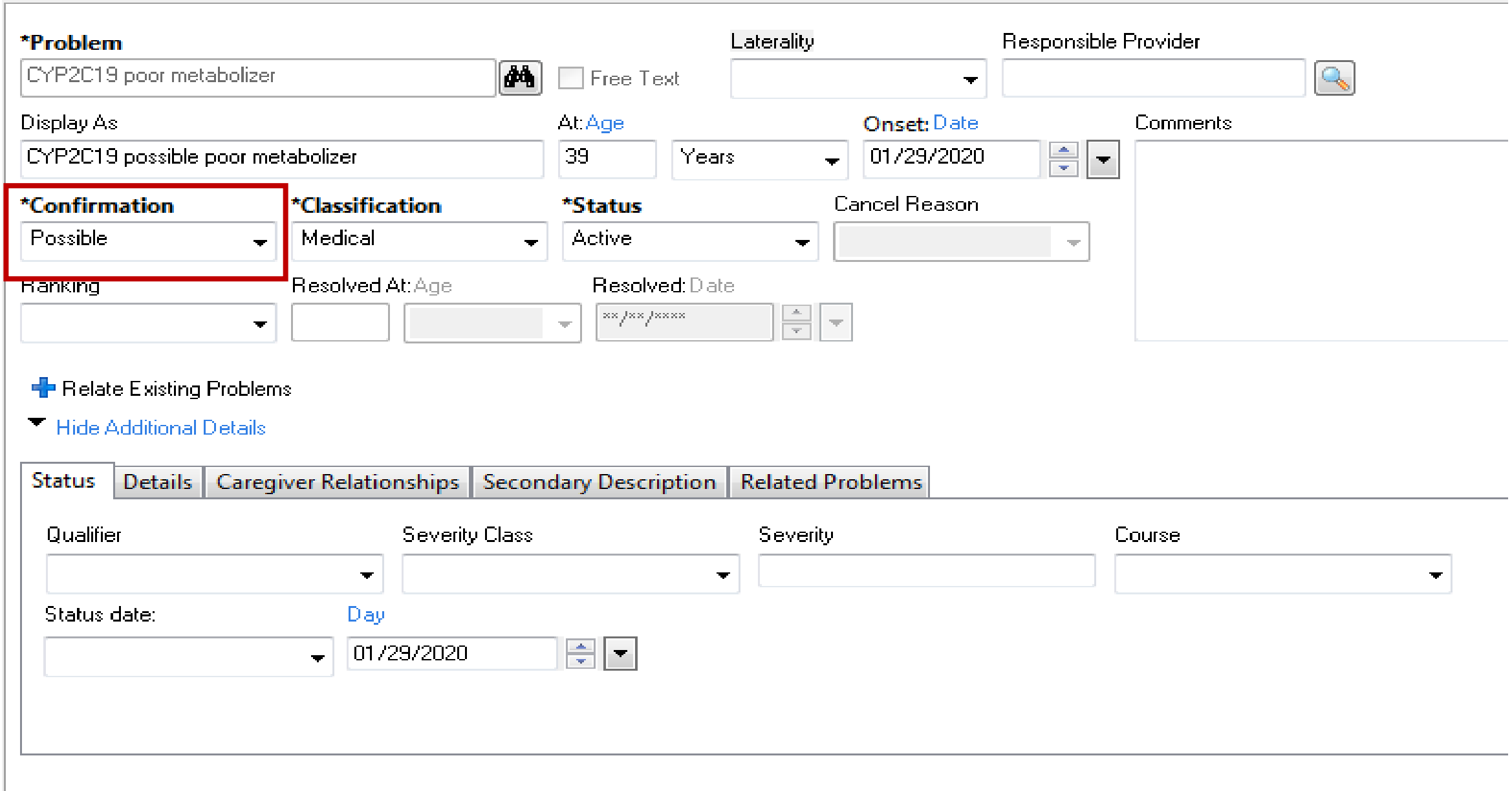
02/06/2020

Confirmation status options



Confirmation Status of “Possible”



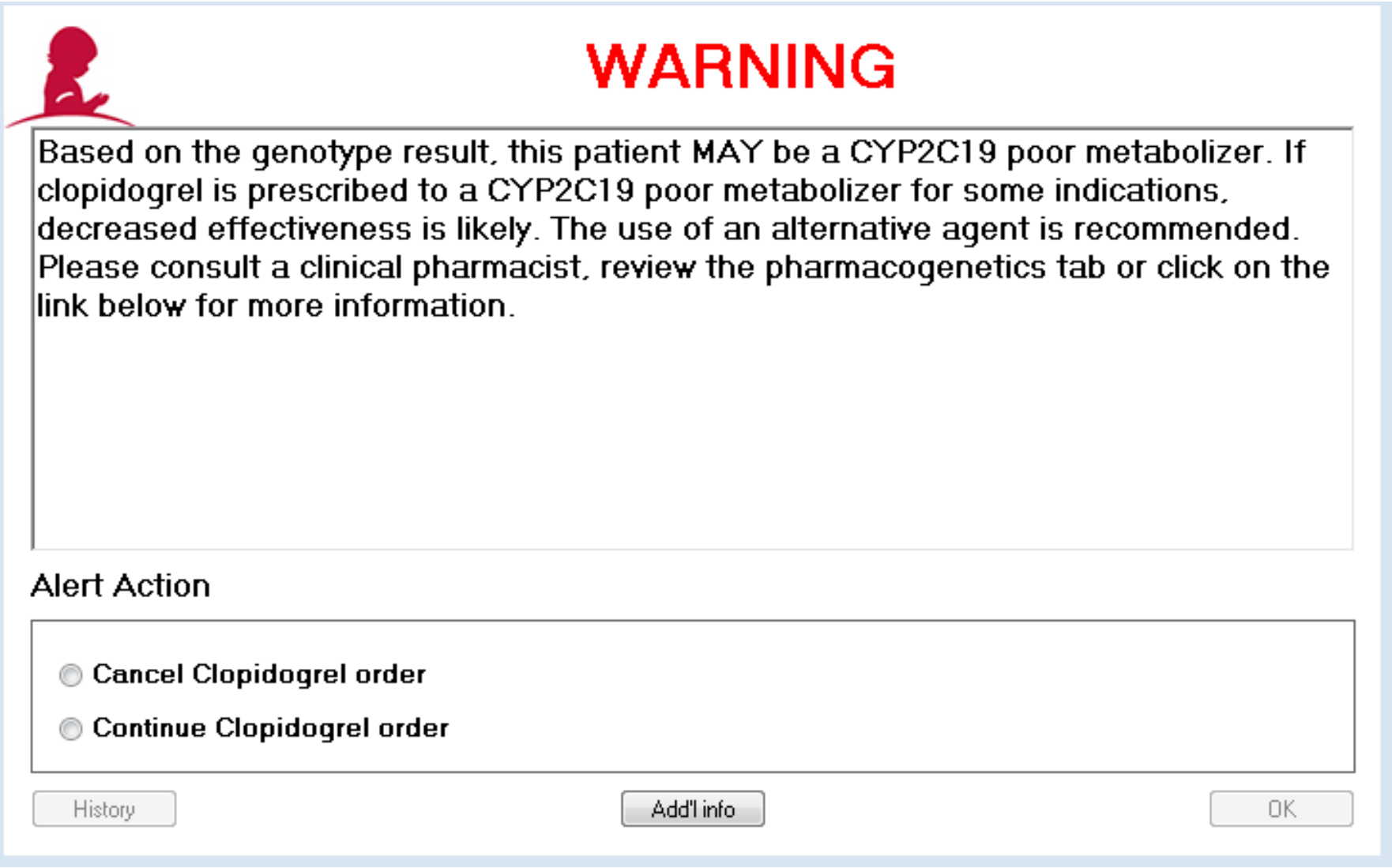
Possible CYP2C19 Poor Metabolizer in Problem List

Problems

Add | Modify | Convert | No Chronic Problems | Display: Active | ... | IMO

Annotated Display	Ranking	Vocabulary	Code	Classification
Asymptomatic human immunodeficiency virus infection		SNOMED CT	152322017	Medical
CYP2C19 possible poor metabolizer		SNOMED CT	3533642015	Medical
CYP2C9 poor metabolizer		SNOMED CT	3532694010	Medical
CYP2D6 ultra-rapid metabolizer		SNOMED CT	3532664016	Medical
DPYD poor metabolizer		SNOMED CT	3532686015	Medical
G6PD - Glucose-6-phosphate dehydrogenase deficiency		SNOMED CT	1220687019	Medical
NUDT15 POOR METABOLIZER		SNODO Codes	NUDT15 POOR ...	Medical
Opioid contract exists		IMO	24288042	Medical
Opioid use agreement exists		IMO	24288036	Medical
PID 123456 SID 789456				Medical
UGT1A1 poor metabolizer		SNOMED CT	3532666019	Medical
				Medical
		Multum Allergy Category		

CDS alert wording for clopidogrel for CYP2C19 Possible PM



CDS alert wording for clopidogrel for CYP2C19 PM