Children's Minnesota Pharmacogenomics Implementation

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Pharmacogenomics Program Director

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Children's Minnesota

One of the largest freestanding pediatric health systems in the United States

Minneapolis

St Paul

429 Staffed beds
5,230 Employees

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- 12 Primary care clinics

Primary care clinic visits
268,273

Children's MINNESOTA | Partners in Pediatrics

Children's MINNESOTA | Metropolitan Pediatric Specialists

- 2 Emergency Departments

96,443
Emergency department visits

- 9 Specialty care sites

Specialty clinic visits
93,894

447,731
OUTPATIENT CLINIC VISITS TOTAL

- 6 Rehabilitation sites

Rehabilitation clinic visits
85,564

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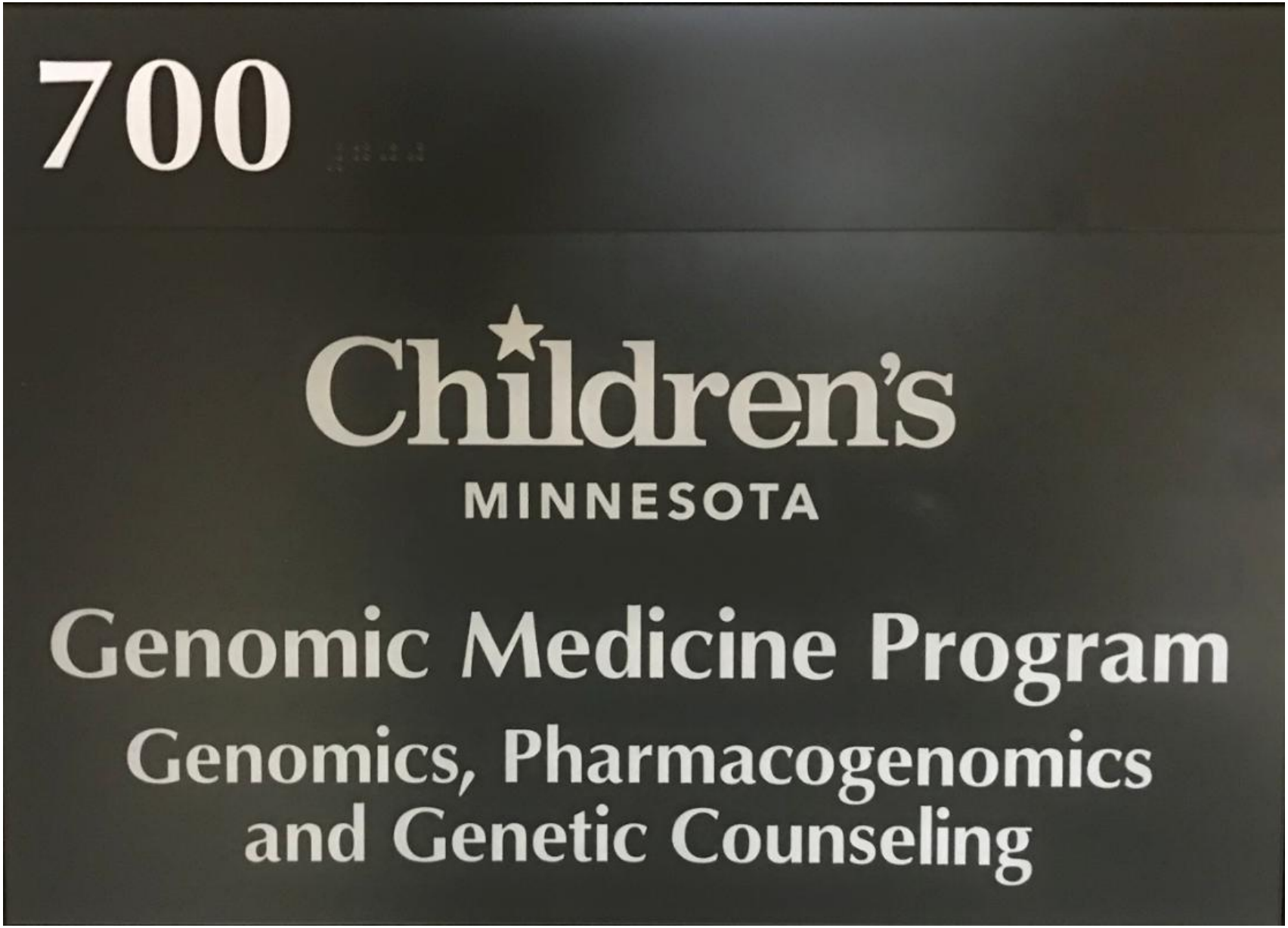
700
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Genomic Medicine Program
Genomics, Pharmacogenomics
and Genetic Counseling

Pharmacogenomics Oversight Committee (POC)

- Membership
  - Pharmacist, Chair
  - Genetics/genomics
  - Hematology/oncology
  - Behavioral health
  - Anesthesiology
  - Pathology
  - Clinical informatics
  - CMIO
  - Administration/strategy
  - Ad hoc – Antimicrobial Stewardship, Pain and Palliative Care, Developmental Pediatrics

Pharmacogenomics Clinic

- Clinic opened 2/10/2017
- Pharmacist and genetic counselor
- Referred by primary care, behavioral health, and developmental pediatrics services
- Appointment types:
  - Pre-test evaluation appointment
    - Prior authorization obtained before PGx testing ordered
  - Results review appointment
- 2 – 3 patients 1 day per week
- 1 – 2 inpatient consults per month

Children's Minnesota EHR Implementation

- PGx result entry
- PGx result display
- Electronic clinical decision support

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PGx Result Entry in EHR – Cerner PowerForm

- Results received in PDF format from all PGx labs
  - Requires result entry by hand
- PowerForm Functionality
  - Entry of discrete PGx results
  - Automatically builds interpretive consults
  - Allows for customized interpretive consults
- Standard consult text exists in a table outside of the results page.
  - Allows for updating interpretive consult without updating each result individually.

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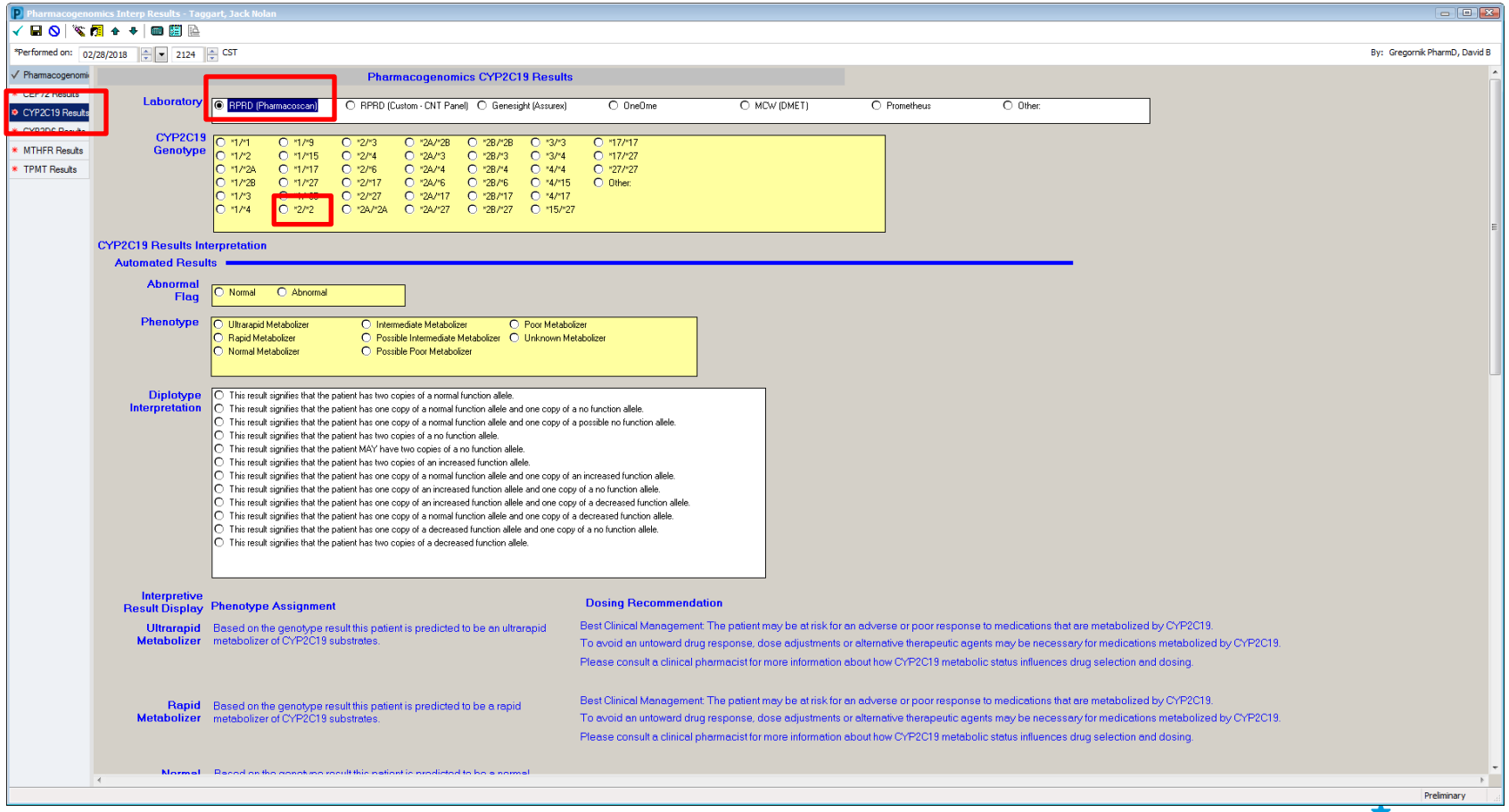
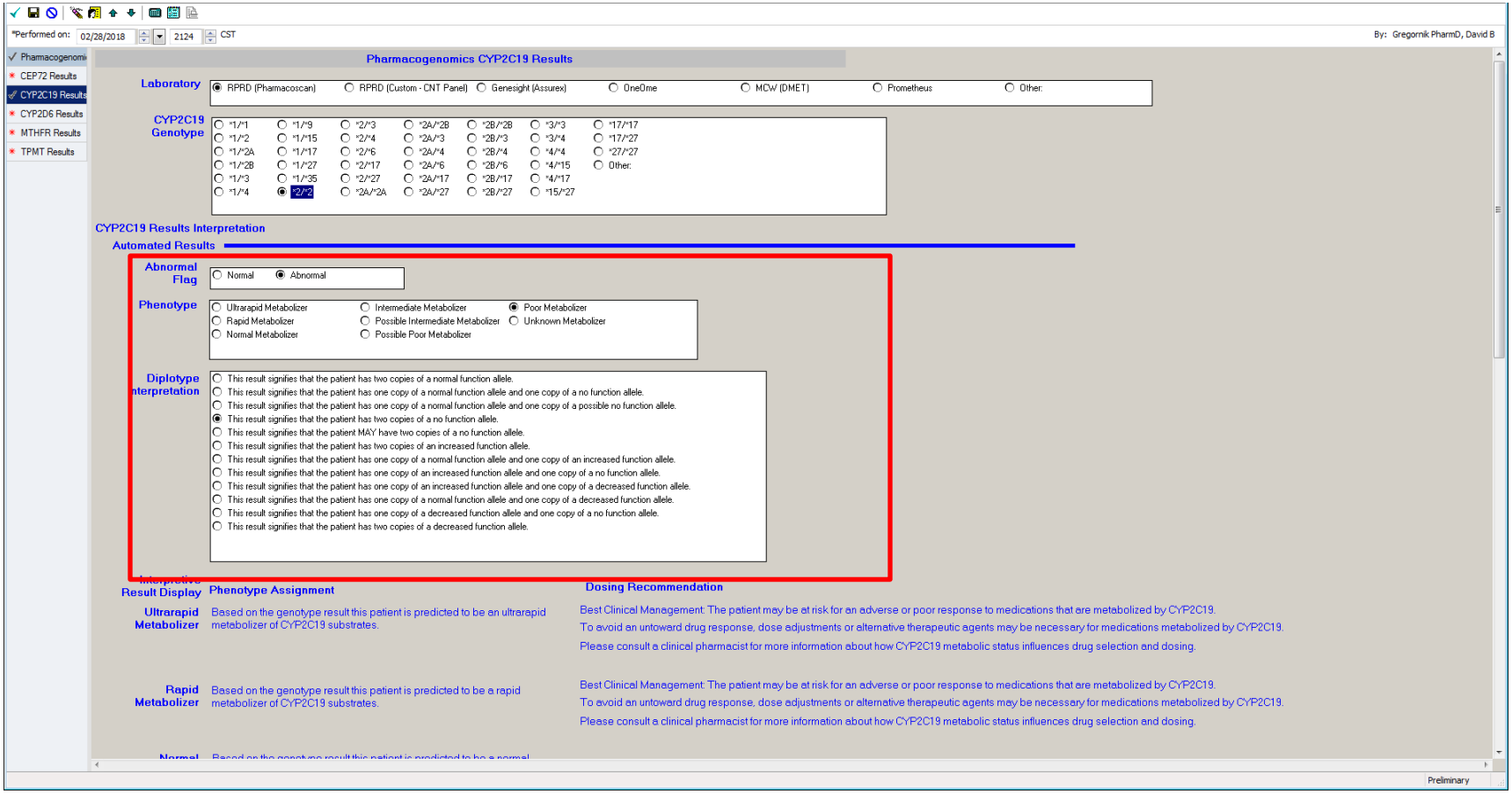
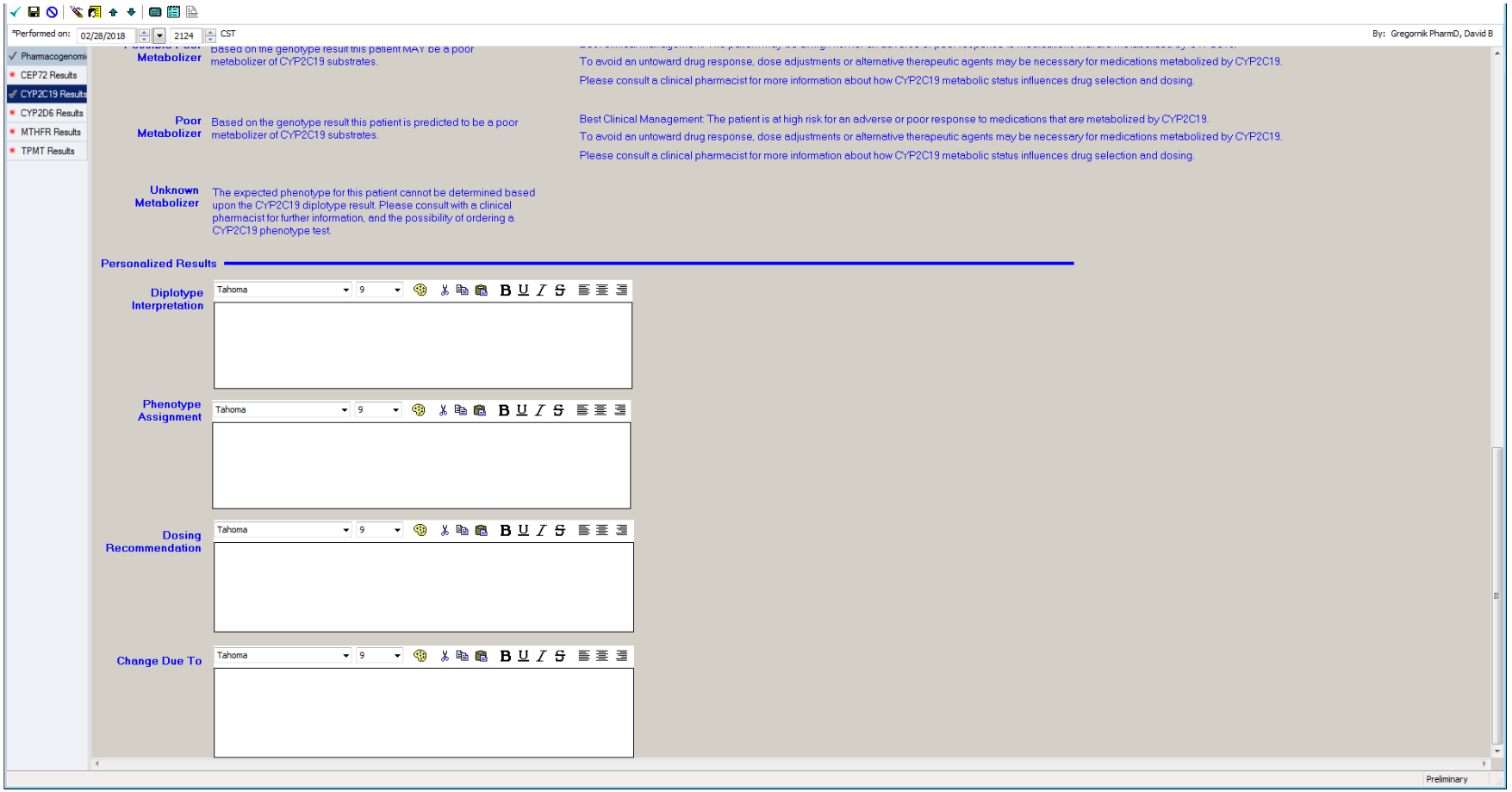
PGx Result Entry in EHR – Cerner PowerForm



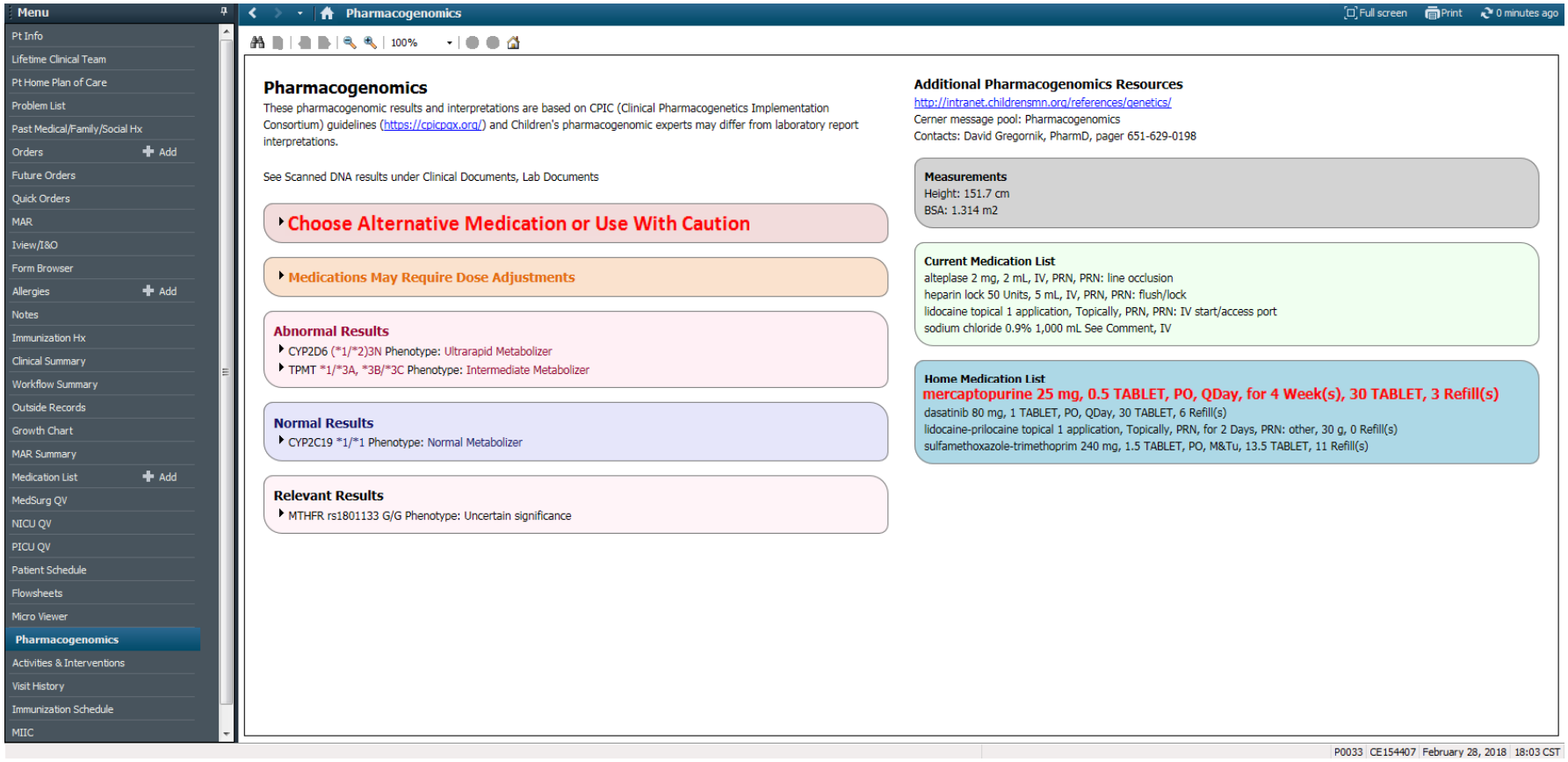
PGx Result Entry in EHR – Cerner PowerForm



PGx Result Entry in EHR – Cerner PowerForm



Pharmacogenomic Results Page (Cerner M-page)



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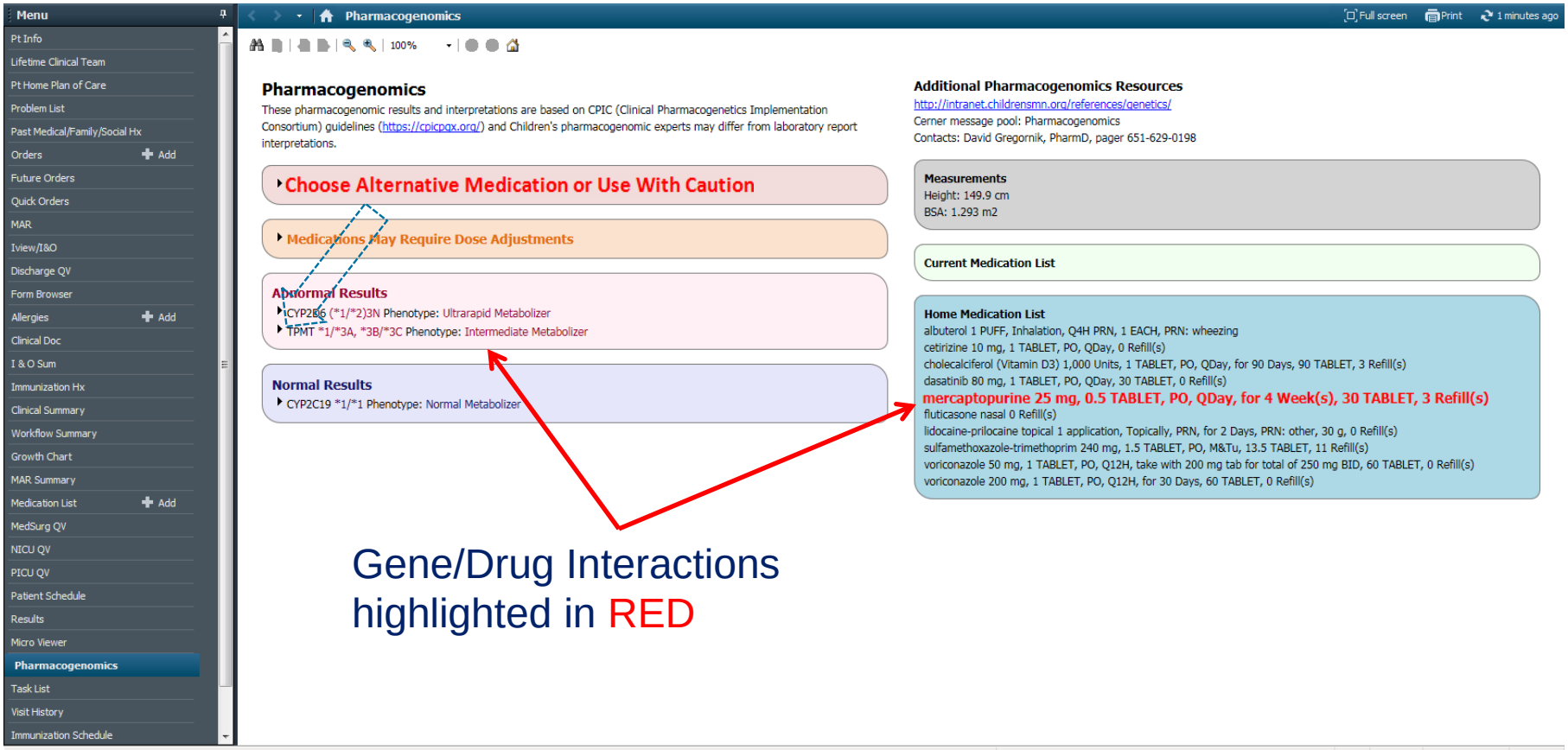
Pharmacogenomic Results Page (Cerner M-page)



Gene/Drug Interactions highlighted in RED

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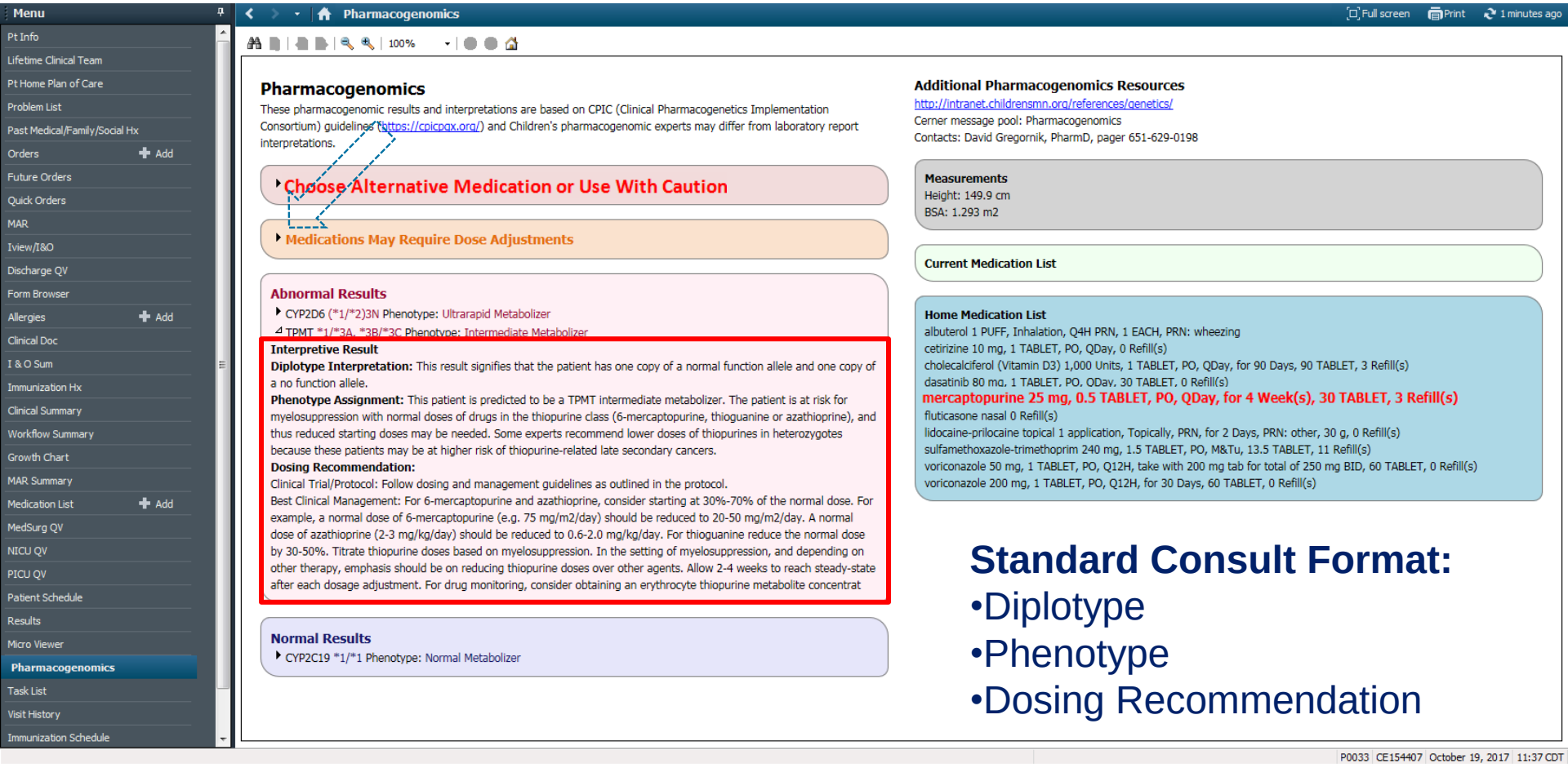
Interpretive Consult for Individual Results



Standard Consult Format:

- Diplotype
- Phenotype
- Dosing Recommendation

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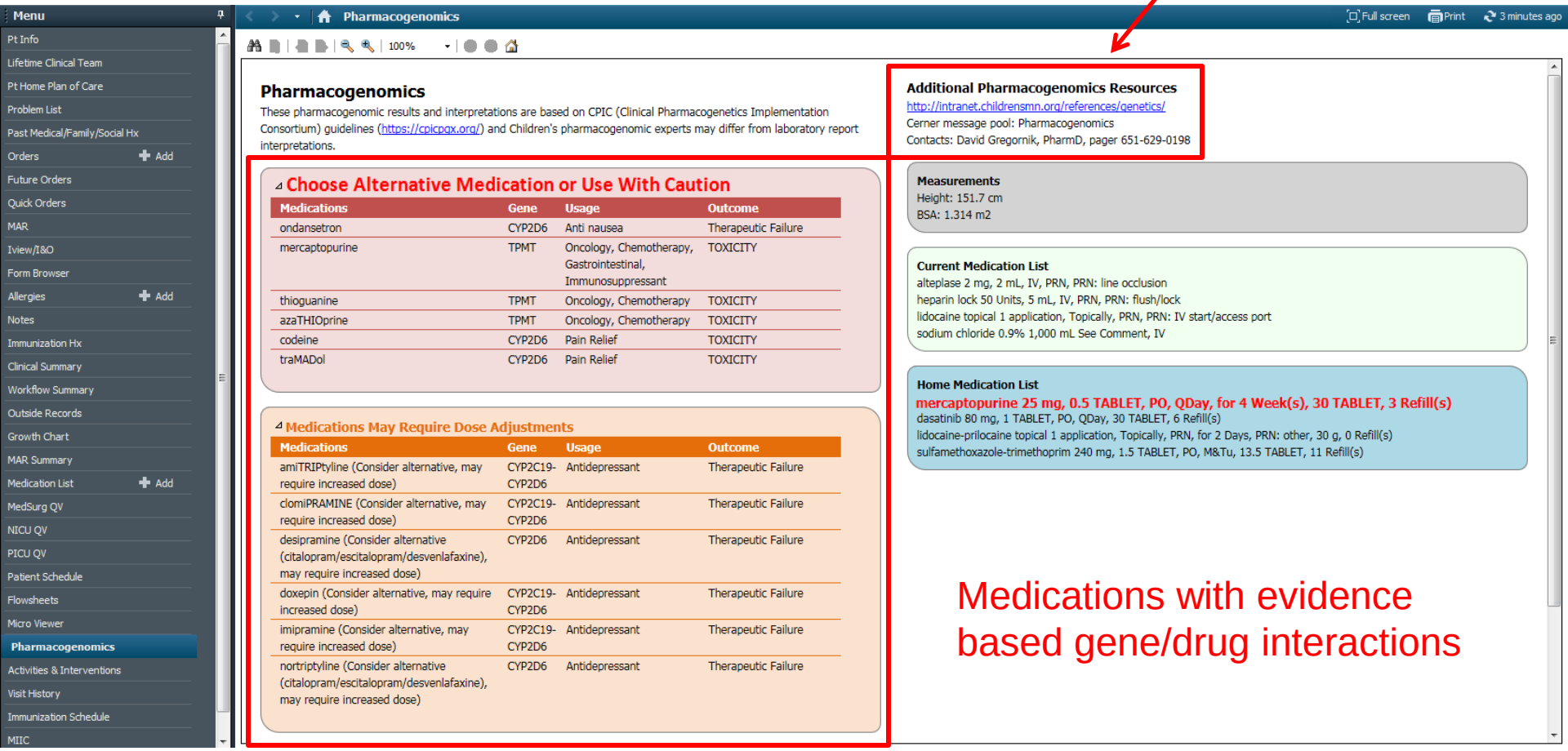
Additional Resources
& Contact Information

Individualized Medication Recommendations



Medications with evidence based gene/drug interactions

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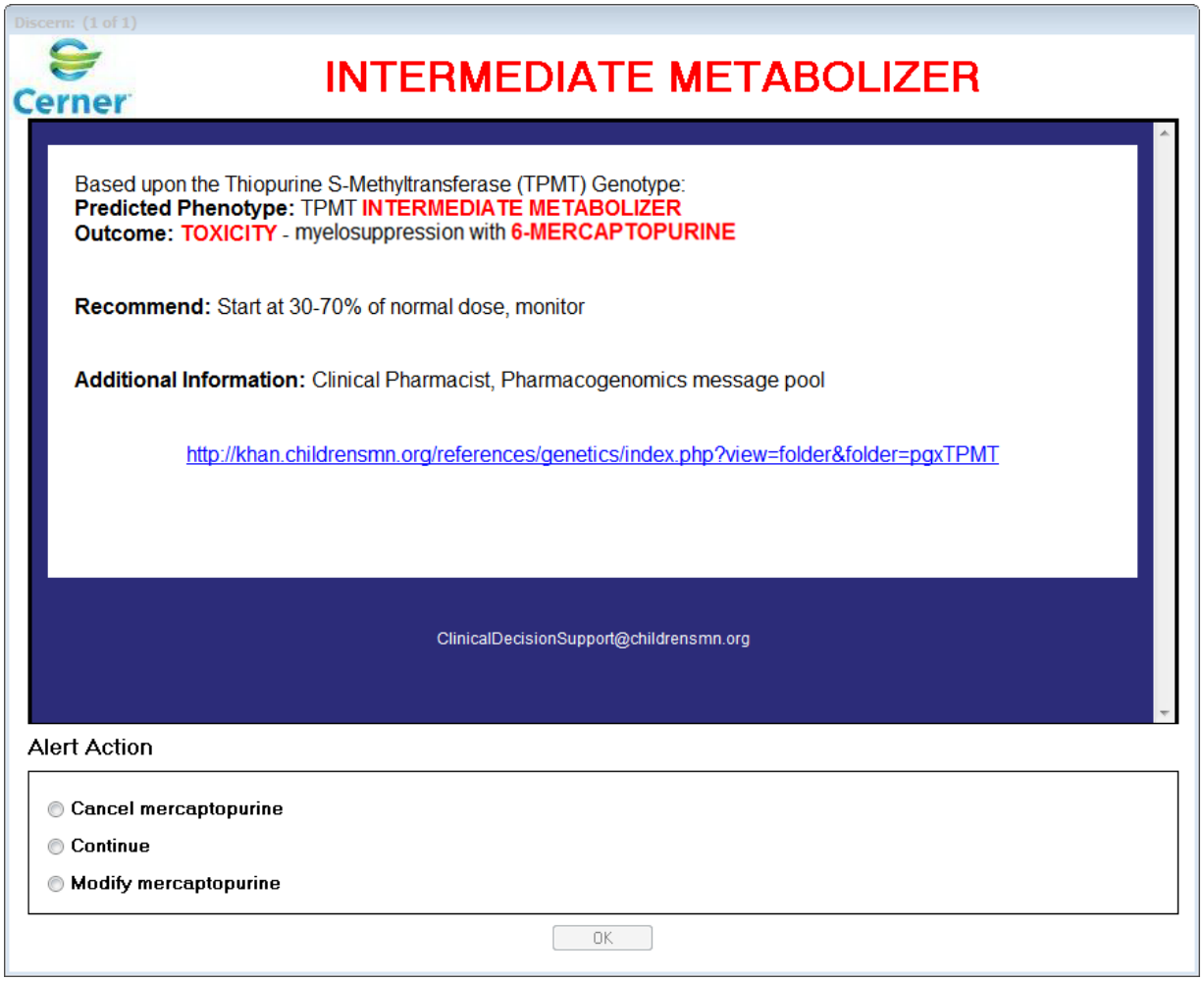
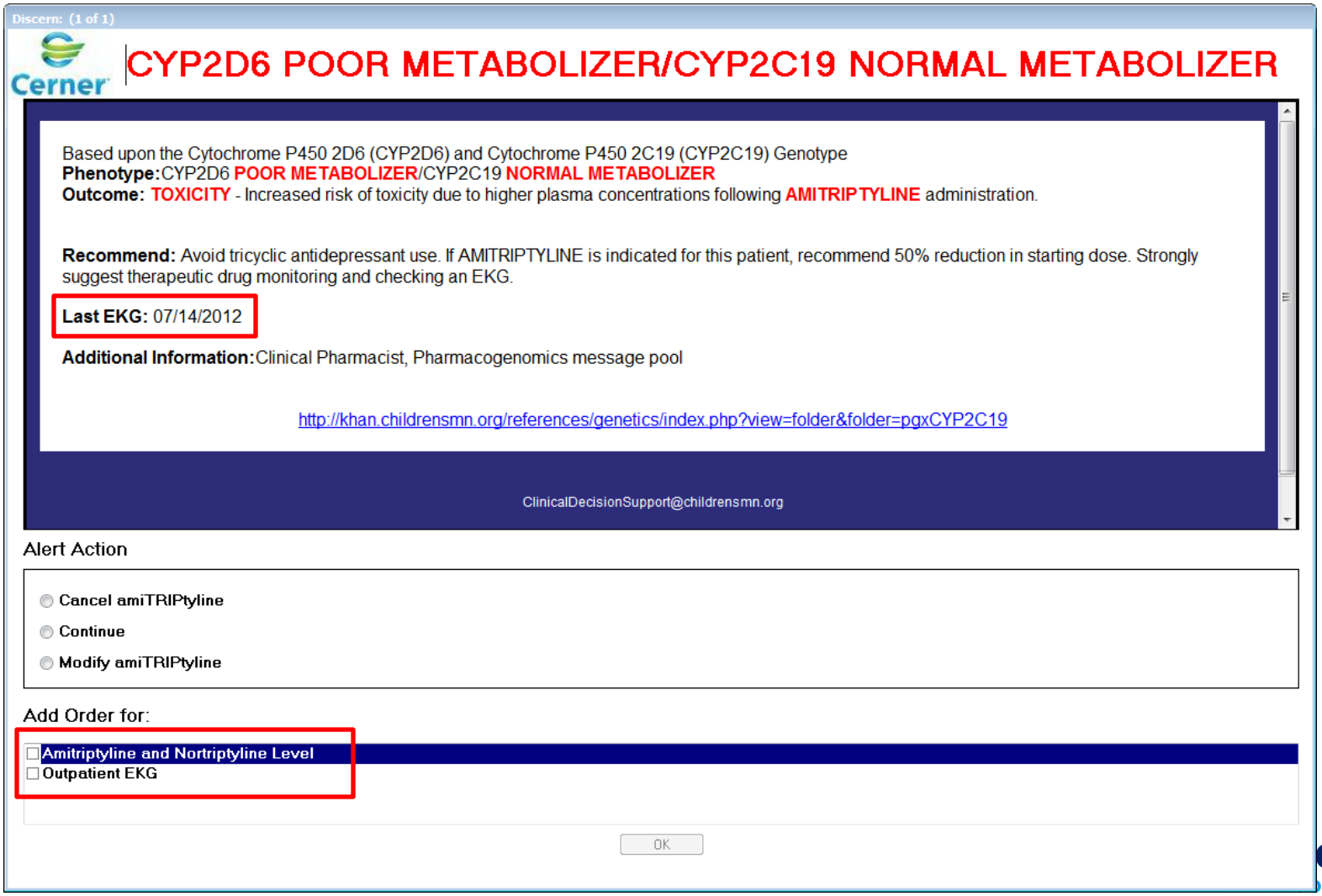
Point of Care Alerts for High Risk Gene/Drug Interactions



Point of Care Alert – 2 Gene Results



Pharmacogenomics at Children's Minnesota

- Implementations to date
  - *TPMT:* Thioguanine, 6-mercaptopurine & Azathioprine
  - *CYP2C19:* Voriconazole, Citalopram, Escitalopram
  - *CYP2D6:* Ondansetron, Tramadol, Aripiprazole, Nortriptyline, Desipramine
  - CYP2C19 & CYP2D6: Amitriptyline, Imipramine, Doxepin

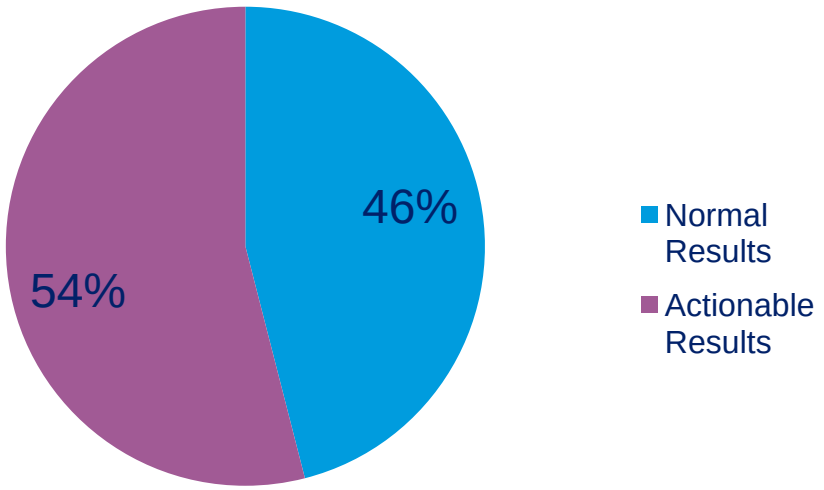
Children's Minnesota Data

- Genes implemented in EHR:
  - *TPMT*
  - *CYP2C19*
  - *CYP2D6*

As of December 31, 2017

- N = 394 patients
- 839 discrete results

Patients with Actionable Results



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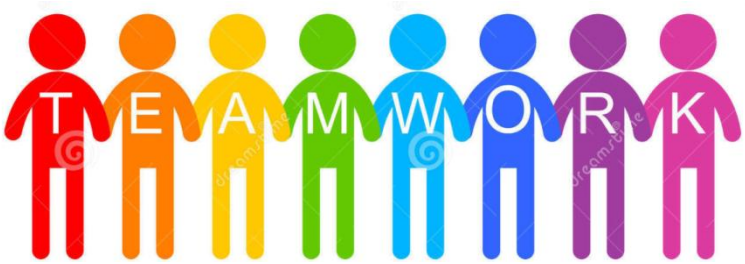
Success Factors

- Strong administration commitment
- Multidisciplinary oversight committee
- Dedicated pharmacist leading implementation
- Enthusiastic pharmacy service
- Customizable (Cerner) EHR
- Experienced IT analyst
- PGx laboratory with > 10 years of experience
- CPIC Guidelines

Ongoing Challenges

- Reimbursement for testing and professional services
- Educating professional staff
- Educating patients
- EHR interoperability – Cerner vs. eClinical Works

Thank You!



Pharmacogenomics Oversight Committee

- Bruce Bostrom
- David Dassenko
- Paul Jensen
- Jen Miller
- Kim Oberstar
- Robyn Reed
- Ann Samuelson
- Gunter Scharer
- Susan Sencer
- Rabindra Tambyraja
- Mike Troy
- Colleen Wherley
- Cathy Wright

Expert Resources

- Stefan Friedrichsdorf
- Steve Grapentine
- Bill Pomputius
- Ulrich Broeckel
- Mark Dunnenberger
- Cyrine Haidar
- James Hoffman

Administration/Strategy/Informatics

- Laura Madsen
- Mary Ellen Mattson
- Nancy Mendelsohn
- Trevor Sawallish
- Judy Wenzel
- Carol Wilcox
- Greg Zarambo

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Questions?

"Here's my sequence..."

New Yorker, 2000

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