

Innovations in Service Delivery in the Age of Genomics

Roundtable on Translating Genomic-Based
Research for Health
Institute of Medicine
July 2008

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Cincinnati, Ohio

change the outcome®



Genomics Influence on Complex Pediatric Disorders

- Define molecular, cellular mechanisms of disease
- Design new therapies
- Identify predispositions to childhood disorders
- Identify predispositions to unintended responses to available therapies



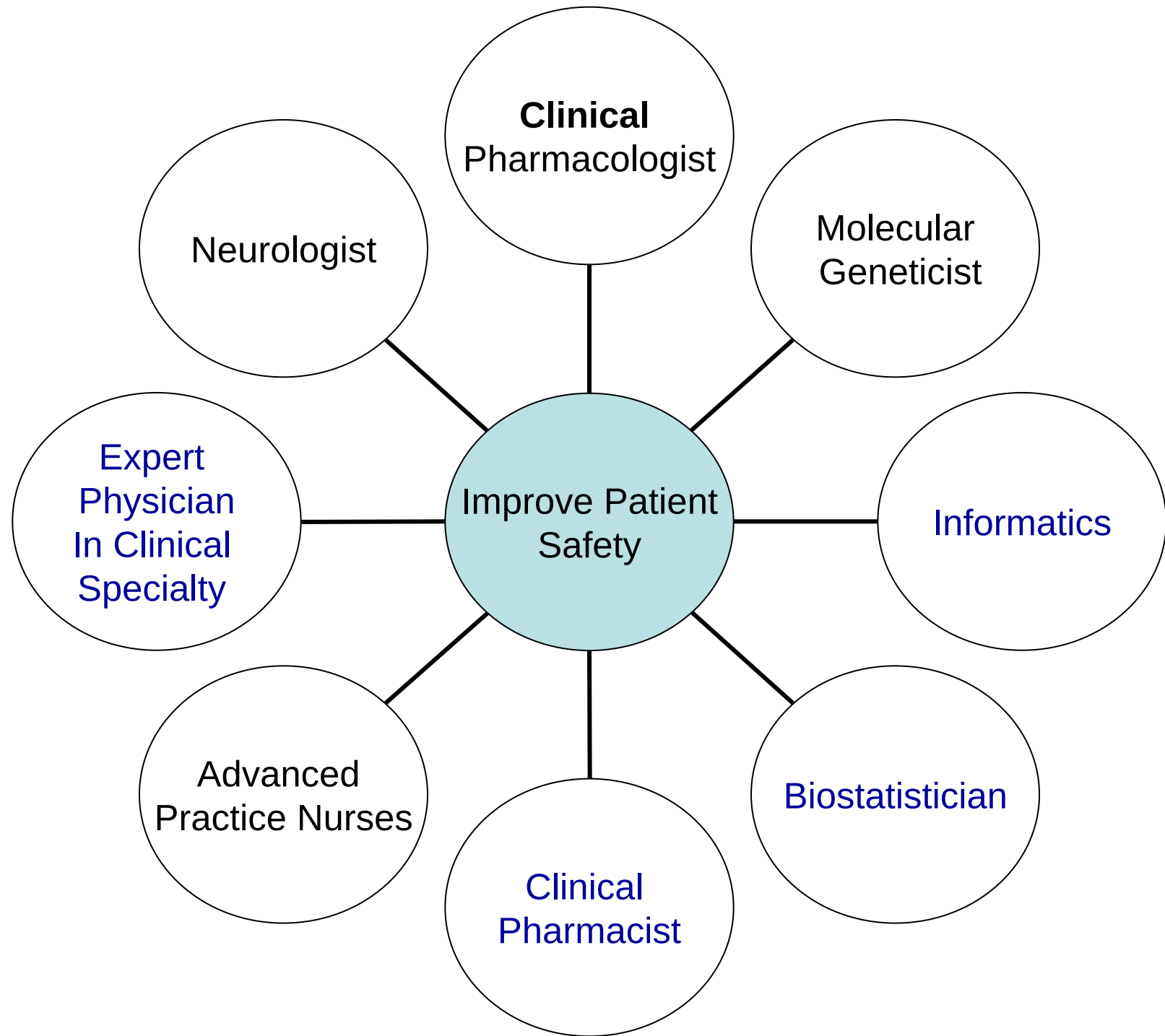
www.capcan.org/HeroBeads.htm

Developing a Model to Integrate Genomics into Specialty Clinical Practice

- Began with pharmacogenetics
 - Gene influences on drug metabolism and variability in patient response studied over 50 years
 - Medications influenced by *CYP2D6*, *CYP2C19*, *CYP2C9*, *TPMT* variants used in pediatric settings
 - Clinicians in specialty practices expressed interest in using pharmacogenetics

Genetic Pharmacology Service

- Shared vision of Richard Wenstrup, MD (molecular, clinical geneticist), Tracy Glauser, MD (neurologist, pharmacologist) & Sander Vinks, PharmD, PhD (clinical pharmacologist)
 - Establish genetic test integration teams
 - Remove need for providers to memorize gene(s)
 - disease; gene(s) – disease risk; gene(s) – drug response associations
 - Expert clinicians develop report templates in partnership with molecular geneticist



Genetic Pharmacology Service

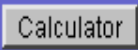
- Internal start up funding October 2003
 - Intuitive ordering system
 - Clinically useful laboratory reports
 - Consultation services
 - Education
- Service available July 2004

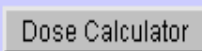
Intuitive Ordering System

Patient: **Testpatient ,Buckeye** User: **NETSAX** 

Inhouse Census
Locate Patient By
Inpatient Name
Patient Index
Rounds Report
Write Orders
Cosign My Orders
Allergies
MAR
Display/Print Orders
Display Orders (View Only)
Worklist/Reports
Inactive Orders
Copy Orders
Vitals Signs
I&O
Clinical
Documentation
Lab Results
Pathology Results
Rad Results
Operative Report
Discharge Summary (View Only)
Pediatric Summary
Patient Info
Resident Coverage
Reference Links

DOB: 4/1/1995 Sex: M Adm Dt: 1/30/2004 Scale WT: KG Dosing WT: 40 KG
Loc: A6N / 604A1 MR#: 01001922 Allergies: NO DRUG ALRGY , NO FOOD ALRGY
Attn Dr: JACOBS, BRIAN R., M.D. NO PRODT ALRGY

New Order  

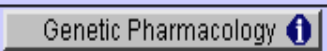
AMITRIPTYLINE HCL 10MG TAB *Required 
Brand Name Equivalent: ELAVIL

*Dose: MG Dosage Form: TABLET Dosing WT: 40. KG
*Route: ORAL

☐ Once ☒ q 1st STAT ☐ Until D/C
 STATx1 Non-Std WK/MO FREQUENCIES ☐ For

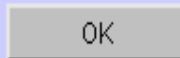
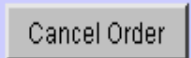
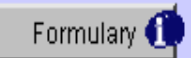
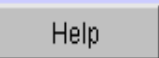
*Priority: ROUTINE *Start Dt/Tm: 7/30/2004 at 1609
If PRN, Reason:

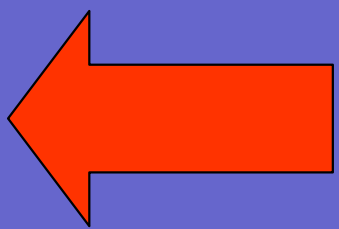
☐ Do Not Administer Unless Directed
☐ Meds Already Given

Pharmacogenetics: 
*Order a Pharmacogenetic Lab Test to help predict how this patient will metabolize this drug? ☐ YES ☐ NO

Additional Directions:

Recommended Dosing Range
Route: PO Daily Frequency:
Per Dose Min: 0.1 MG/KG Min: 1
Per Dose Max: 2 MG/KG Max: 1
Daily Dose Not to Exceed: 3 MG/KG



- Vital Signs/T/HR/Wt
- I&O
- Hourly Checks
- Bedside Testing
- Worklist/Reports
- MD VO
- Inactive Orders
- Document Event
- Erroneous Orders
- Display
- Documentation
- Display/Print Orders
- Patient Results
- ADT Functions
- Pt Classification
- Pediatric Summary
- Patient Info
- Impact SIS
- (Immunizations)
- CCHMC Formulary
- Discharge Packet
- Discharge Summary
- (View Only)
- Help Content
- Abbreviation
- Directory
- User Lookup
- Nutrition Therapy
- Med/IV Charting
- Answer Set
- A7 EBP Webpage

New Order

[Calculator](#)[ClinDoc Feedback](#)**FLUOXETINE 20MG CAPSULE**

* Required

[Dose Calculator](#)

Brand Name Equivalent: PROZAC (FLUOXETINE)

*Dose: MG

Dosage Form: CAPSULE

Dosing WT: 25 KG*Route: ORAL☐ Once☒ q

1st STAT

☒ Until D/C

STATx1

Non-Std

☐ WK/MO FREQUENCIES☐ For*Clinician Contact
Pager:
*Priority: ROUTINE*Start Dt/Tm: 4/2/2007 at 1502

If PRN, Reason:

☐ Do Not Administer Unless Directed☐ Meds Already Given[Genetic Pharmacology](#) 

***Order a Pharmacogenetics Lab Test to Help
Predict How This Patient Will Metabolize This
Drug? (No Specimen Required Since the Gene
Involved was Tested for a Different Drug)**

☐ YES☐ NO

Additional Directions:

OK

Cancel Order

Formulary 

Help

OVR GHMDE002:P 04/02/2007 15:03

Patient: **Testpatient ,Bluejacket**

User: **NETSAX** ★  Log Off

Inhouse Census

● **Patient Index**

Rounds Report

▶ Write Orders

Cosign My Orders

Allergies

● MAR

Display/Print Orders

Display Orders (View Only)

Worklist/Reports

Inactive Orders

Copy Orders

Vitals Signs

● I&O

● Clinical

● Documentation

● Lab Results

● Pathology Results

● Rad Results

Operative Report

Discharge Summary (View Only)

Pediatric Summary

● Patient Info

Resident Coverage

● Reference Links

Locate Patient By

DOB: 10/10/2000 Sex: M Adm Dt: 12/10/2003
Loc: A6N / 614A1 MR#: 01002707
Attn Dr: JACOBS, BRIAN R., M.D.

Scale WT: KG Dosing WT: 20 KG
Allergies: NO DRUG ALRGY , NO FOOD ALRGY
NO PRODT ALRGY

New Order : Medication

Calculator

COE Feedback

AMITRIPTYLINE HCL 10MG TAB

* Required

Dose Calculator

Brand Name Equivalent: ELAVIL

*Dose: MG

Dosage Form: TABLET

Dosing WT: 20. KG

*Route: ORAL

☐ Once

☒ q

1st STAT

☒ Until D/C

*Clinician Contact
Pager:

STATx1

Non-Std

☐ WK/MO FREQUENCIES

☐ For

*Priority: ROUTINE

*Start Dt/Tm: 7/30/2004 at 1609

If PRN, Reason:

☐ Do Not Administer Unless Directed

☐ Meds Already Given

Pharmacogenetics:

Genetic Pharmacology 

**Note: A Pharmacogenetic Lab Test has been
Ordered for this Drug. The lab result(s) can be
found under Drug/TDM/Tox**

Additional Directions:

Recommended Dosing Range

Route: PO

Per Dose Min: 0.1 MG/KG

Daily Frequency:

Min: 1

Per Dose Max: 2 MG/KG

Max: 1

Daily Dose Not to Exceed: 3

MG/KG

OK

Cancel Order

Formulary 

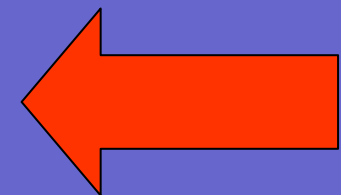
Help



[OVR]

GHMDE002:P

07/30/2004 16:09



Find a Service Alphabetically Genetic Pharmacology Service

Overview

Why Choose Us?

Drugs Tested - Panels

Meet the Team

Request a Consult

Order a Test

Shipping Instructions

► Education

Frequent Questions

Other Resources

Contact Us

Building a Future of Personalized Medicine for Children and Adults Through Pharmacogenetics

[Explanation](#) | [What's Inside](#) | [Benefits](#) | [Goal](#)

Scientific evidence indicates that **pharmacogenetics** -- the study of drug interactions with an individual's genetic makeup -- may improve patient safety.

Pharmacogenetic testing for some medications adds genetic information to the usual considerations of patient age, weight, disease process, use of other medications, health behaviors and environment. The additional information gained from pharmacogenetics can help physicians and nurse practitioners choose and dose medication that best meets the needs of the individual patient.



[Back to Top](#)

What's Inside

The Genetic Pharmacology Service web site includes information about:

- [Why Choose Us](#)
- [Drugs Tested / Panels](#)
- [Meet the Team](#)
- [Request a Consult](#)

Pharmacogenetics Changes Outcome for Families



Fighting Disease With DNA: Doctors Use Genes to Prescribe Appropriate Treatments

"I do envision in the next five to 10 years, the number of genes we'll test will grow immensely, and the number of opportunities for patients to get more personalized care, will grow

Clinically Useful Reports

- Available in 2 business days
- Test performed
- Predicted phenotype (PM, IM, EM, UM)
- General dosing recommendations
- Key enzyme inhibitors / inducers
- Critical drug – drug interactions
- Test limitations
- Location of supplemental information

Respond to Need of Prescribing Professionals

- Psychiatrists: PG test for panel of psychotropics
- Gastroenterology & Oncology: Order TPMT test by gene rather than drug & report genotype
- Oncology: Tamoxifen PG test
- Cardiology (most recent): Warfarin test (CYP2C9 + VKORC1)

Pharmacogenetics Education

- Prior to launching GPS
 - Inservices at faculty staff meetings
 - Pediatric grand rounds, resident conferences
 - Unit based nurse educators' inservices
 - Education binders on every patient care unit
 - Patient / parent fact sheets posted online
- After launching GPS
 - Pediatric nursing grand rounds, APN local conference
 - Regional APN conference
 - Online education

Genetics Education Program for Nurses

Clinical Training Programs Genetics Education Program for Nurses

What's Inside

- ▶ About GEPN
- ▶ Organizations Served
- ▶ Educational Resources
- ▶ Curriculum Questions
- ▶ Continuing Education Options
- Log In to Independent Modules

What's Inside

Welcome to the Genetics Education Program for Nurses (GEPN) at Cincinnati Children's Hospital Medical Center. The GEPN offers genetics educational opportunities and resources for nurses. Here are the items you can find on this site:

Nursing Curriculum Modules

Each of the **14 Modules** consists of a set of assignments, answers and instructional resources that can be used in a variety of ways. Individual Modules can be integrated into existing credit awarding nursing courses. Or, the Modules can be used to create an academic credit awarding genetics nursing course.

Continuing Education

Registration for the following education offerings are now open **FOR ALL NURSES:**

- Available since 2002**
- [Web-Based Genetics Institute](#) (18-week offering) Teacher facilitated online course with weekly assignments. 188 nursing contact hours will be awarded to nurses who participate in an entire course and complete all related evaluations. The upcoming session is as follows:
 - **January 23 - May 29, 2009, \$1200 (one-week of 'online' orientation begins January 19th)**
- Available since 2008**
- [Applying Genomics in Nursing Practice](#) (5-week offering) Teacher facilitated online course with weekly assignments. 21.25 nursing contact hours will be awarded to nurses who participate in an entire course and complete all related assignments and evaluations.
 - **September 26 - October 31, 2008 - (Orientation begins on September 22nd), \$400**
 - **March 20 - April 24, 2009 - (Orientation begins on March 16th), \$400**
 - [Genetics is Relevant Now: Nurses' Views and Patient Stories](#) - There are **TWO** versions of this

<http://gepn.cchmc.org>



Independent Self-Paced Modules

- 
- **Nurses' Role in Pharmacogenetics / Pharmacogenomics** - This module is designed for the following purpose: Help patients understand the purpose and limitations of pharmacogenetics testing and the implications of their test results. The modules can be completed from a **Personal Computer or Macintosh Apple**. Please review the [minimum computer](#) requirements needed. 4.3 nursing contact hours will be awarded to nurses who participate in an entire course and complete all related evaluations.
 - **Environmental Genetics and Complex Diseases** - This module is designed to help the learner meet the following skills-based learning outcome: To improve nurses' abilities to help people understand the influence of genetic and environmental factors on disease susceptibility, prevention and treatment. The modules can be completed from a **Personal Computer or Macintosh Apple**. Please review the [minimum computer](#) requirements needed. 4.1 nursing contact hours will be awarded to nurses who participate in an entire course and complete all related evaluations.
 - **Promoting Informed Decision Making about Genetic Testing Self-Paced Module** -- This module is designed to help the learner meet the following skills-based learning outcome: Promote a person's / family's ability to make an informed decision about genetic testing. The modules can be completed from a **Personal Computer or Macintosh Apple**. Please review the [minimum computer requirements](#) needed. 5.8 nursing contact hours will be awarded to nurses who participate in an entire course and complete all related evaluations. A processing fee is required and will be determined prior to September 28th.
 - **Ethical and Social Issues Related to Genetic Testing Self-Paced Module** -- This module is designed to help the learner meet the following skills-based learning outcome: Identify ethical and social issues related to genetic testing and recording of genetic information. The modules can be completed from a **Personal Computer or Macintosh Apple**. Please review the [minimum computer requirements](#) needed. 4.7 nursing contact hours will be awarded to nurses who participate in an entire course and complete all related evaluations.
 - **Interpreting Family History Self-Paced Module** -- This module is designed to help the learner meet the following skills-based learning outcome: Interpreting family history information to identify and refer clients who can benefit from genetic services. The modules can be completed from a

Independent Self-Paced Modules

The independent self-paced modules have been completely re-programmed, re-formatted. **Cost of each module is \$15.** All five modules can be accessed for \$60 (**buy four get one FREE**). Online payment processing is now available. Following the links to the left of this frame to access the modules.

Number of Learners Completing Each Independent, Self-Paced Module

Module Title	Date Available	# Learners
Interpreting Family History	April 2004	521
Ethical and Social Issues Related to Genetic Testing	September 2004	101
Promoting Informed Decision Making about Genetic Testing	September 2005	226
Environmental Genetics and Complex Diseases	February 2006	65
Genetics is Relevant Now: Nurses' Views and Patient Stories	August 2006	469
Nurses' Role in Pharmacogenetics / Pharmacogenomics	September 2006	196

New Service Delivery Model In Age of Genomics

- What are the required skills for physicians, nurses, pharmacists, other health care professionals?
 - NCHPEG Core Competencies
 - Essential Nursing Competencies and Curricula Guidelines
- How do we provide the necessary education to enable professionals to acquire these skills?
- How do we evaluate skill competency?

Acknowledgements

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- Cynthia Prows, MSN, CNS
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