PERSONALIZED MEDICINE IN PRACTICE: LEVERAGING PHARMACOGENETICS FOR OPTIMIZED MEDICATION THERAPY IN COMPLEX PATIENTS

Transforming healthcare through tailored treatment approaches





OUR OBJECTIVES FOR TODAY

1. Understand the Principles of Pharmacogenetics:

Explain how genetic variations influence drug metabolism, efficacy, and adverse effects, and recognize key pharmacogenetic biomarkers along with prevailing data on drug-drug interactions, black box warnings and other implications to drug therapy compliance.

2. Apply Pharmacogenetic Information to Medication Therapy Optimization:

Analyze how pharmacogenetic data can be integrated into clinical decisionmaking to personalize drug selection and dosing for improved patient outcomes along with a full regimen of lifestyle analysis and concurrent OTC utilization to more effectively manage patients on polypharmacy and diagnosed with multiple chronic conditions.

3. Evaluate the Clinical Application of Medication Therapy Optimization(MTO) including Pharmacogenetic Testing:

Discuss the benefits, limitations, and practical applications of this information through EHR's, Community Health Centers and other key stakeholders in Rural Health.



INTRODUCTION TOPERSONALIZED MEDICINE

DEFINITION AND PRINCIPLES OF PERSONALIZED MEDICINE

Tailored Treatments

Personalized medicine seeks to customize medical treatment based on individual patient characteristics, enhancing treatment effectiveness.

Genetic Testing

Genetic testing is a crucial component of personalized medicine, helping to identify the best medications for each patient.



UNDERSTANDING PHARMACOGENETICS

UNDERSTANDING THE IMPACT OF GENETIC DIFFERENCES

Differences in Drug Metabolism

These primarily affect how quickly or slowly a person processes a drug. The main enzyme families involved are the cytochrome P450 (CYP450) enzymes, such as CYP2D6, CYP2C9, and CYP2C1

Genetic Variants and Therapeutic Response

Differences in genes encoding **drug targets (e.g., receptors, enzymes)** influence how effectively a drug works

Risk of Adverse effects

Genetic differences in detoxifying enzymes or transporters can lead to drug buildup and toxicity

FUNDAMENTALS OF PHARMACOGENETICS

Genetic Variations

Genetic variations can significantly influence how individuals respond to medications, impacting efficacy and safety.

Tailored Treatments

Pharmacogenetics enables healthcare providers to customize treatments based on a patient's unique genetic makeup for better outcomes.





GENETIC VARIATIONS AFFECTING DRUG METABOLISM

Impact on Drug Response

Genetic variations in enzymes can affect how effectively a drug works in different individuals, influencing treatment outcomes.

Efficacy Differences

These genetic differences can lead to variations in the efficacy of medications, necessitating personalized treatment approaches.

Adverse Effects Risk

Genetic variations can increase the risk of adverse drug reactions, highlighting the need for careful medication management.

TOOLS AND TECHNIQUES FOR PHARMACOGENETIC TESTING





Next-Generation Sequencing

Next-generation sequencing is a revolutionary technology allowing for rapid and comprehensive analysis of genetic information.

Genotyping Techniques

Genotyping techniques enable clinicians to identify genetic variants that can affect drug response and metabolism.



Pharmacogenetic Profile Assessment

These tools help assess a patient's pharmacogenetic profile to optimize personalized medicine and drug therapy.

OPTIMIZING MEDICATION THERAPY

MATCHING MEDICATIONS TO PATIENT PROFILES





Pharmacogenetic Testing

Pharmacogenetic testing allows healthcare providers to analyze a patient's genetic profile to determine the most effective medications.

Personalized Medicine

Matching medications to complete patient profiles leads to personalized medicine, enhancing treatment effectiveness and minimizing side effects.



Improved Outcomes and Total patient care

Utilizing pharmacogenetic information combined with additional prescribing reviews and lifestyle evaluation can significantly improve patient outcomes and optimize therapeutic strategies.



CASE STUDIES OF INTERVENTIONS

Economic Impact: TRS Kentucky

Medicare Advantage Cohort

• 5,288 interventions | 22,357 controls

Medication Management Program. J. Pers. Med. 2022, 12, 421

- 67% female
- Average age 73

Participants

- Average of 13.0 and 11.9 medications among intervention and control cohorts, respectively
- 66% of intervention participants expressed genetic risk for at least one current medication

6.8% FEWER EMERGENCY DEPT. VISITS J4.9% FEWER INPATIENT DAYS (8.4%) SAVINGS PMPM Inflation-adjusted savings pe Jarvis, JP, et al. Real-World Impact of a Pharmacogenomics-Enriched Comprehensive

68% **DEPT. VISITS**

No Action 32%

Actionable

Inflation-adjusted savings per month following intervention

Economic Impact: Quest Diagnostics

Self-Funded Employer Cohort

- 452 interventions | 1,500 controls
- 74% female
- Average age 53

Participants

• Average of 12.6 medications (4.2 PGx medications) in both intervention and control cohorts

FragalaMS, et al. Clinical and Economic Outcomes of a Pharmacogenomics-enriched Comprehensive Medication Management Program in a Self-insured Employee Population. The Pharmacogenomics Journal (2024) 24:30



CURRENT OBSERVATIONS AND EXPERIENCE

Risk Reduction by Type





BENEFITS OF PERSONALIZED APPROACHES AND MTO IN HEALTHCARE



Improved Treatment Outcomes

Personalized approaches lead to tailored treatments that significantly enhance patient recovery and overall health outcomes.

Reduced Trial-and-Error Prescribing

These approaches minimize the guesswork in prescribing medications, leading to quicker and more effective solutions.

Minimized Side Effects

Personalized medicine aims to reduce adverse effects by ensuring that treatments are better suited to individual patient profiles.

Enhanced Patient Engagement

Personalized healthcare encourages patients to take an active role in their treatment decisions and management.

MANAGING COMPLEX PATIENTS



MULTIDISCIPLINARY APPROACH TO PATIENT MANAGEMENT

Collaboration in Healthcare

A multidisciplinary approach involves collaboration among healthcare professionals from various specialties to enhance patient care.

Comprehensive Care Plans

Creating comprehensive care plans ensures that all aspects of a patient's health are addressed, leading to better outcomes.

Pharmacogenetic Information

Incorporating pharmacogenetic information into care plans allows for personalized treatment strategies tailored to individual patient needs.

CHALLENGES AND CONSIDERATIONS IN THERAPY OPTIMIZATION IN RURAL AND UNDERSERVED AREAS





Accessibility of Pharmacogenetics

Ensuring access to pharmacogenetic testing for all patients is crucial for effective therapy optimization in a manner that is reasonable.

Interpreting Genetic Data

Leveraging remote and telehealth resources to assist in review, interpretation and coordination

Integration into Clinical Practice

Integrating medication therapy optimization into everyday clinical practice requires training and adaptation of existing workflows.

CONCLUSION

Advancements in Personalized Medicine

Personalized medicine is evolving, allowing for custom healthcare solutions tailored to individual genetic profiles.

Pharmacogenetics Impact

Pharmacogenetics helps predict individual responses to medications, enhancing treatment efficacy and safety.

Improving Health Outcomes

By understanding the entirety of the patient's profile including genetic influences, healthcare providers can offer better care for complex patients.

