PRECISION GENETICS

WHITE PAPER

Transforming Mental Health at the Front Line: Using Data-Driven Genetic Insights in **Primary Care**

Mental illness is not only disabling patients — it's drowning front line primary care clinicians. These dedicated physicians and midlevel providers face the daunting task of combating the crisis with few successful first line treatment options at their disposal. Treatment becomes a protracted journey of trial and error, leaving at-risk patients to endure prolonged suffering. We can do better.

Emerging, proven technologies like genotype-guided testing and advanced analytics enable more effective, personalized precision medicine approaches to mental health treatment. With genetically-guided treatment plans, primary care clinicians can play a pivotal role in transforming mental healthcare.

KEY POINTS

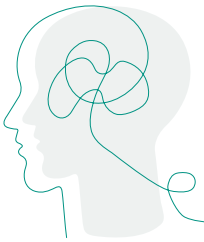
- Mental health issues are highly prevalent but underserved, leaving primary care physicians struggling to address them.
- Psychiatric medications often have poor efficacy and high adverse reaction rates, posing treatment challenges.
- Prescribing practices must be reevaluated to improve mental healthcare safety and effectiveness.
- Genotype-guided testing enables personalized medicine by guiding medication choices based on genetics.
- Emerging technology can help modernize the standard of care by improving outcomes, streamlining efficiencies, and impacting downstream costs to the system.

A METASTATIC MENTAL HEALTH CRISIS

The U.S. Department of Health and Human Services' 2022 National Survey on Drug Use and Health provides a stark overview of mental health in the United States, revealing that nearly one in four adults, or 23.1% of the adult population, experienced a mental illness within the past year. Moreover, the survey highlights a significant concern among younger individuals, noting that 19.5% of adolescents aged 12 to 17, or approximately 4.8 million youths, endured a major depressive episode in the past year.

Mental illness is also life threating, as evidenced by a concerning trend in the survey results: 1 in 20 adults reported serious suicidal thoughts in the past year. Furthermore, 1.5% (or 3.8 million people) formulated a suicide plan, and 0.6% (or 1.6 million people) attempted suicide within the same timeframe. Alarmingly, the situation among adolescents aged 12 to 17 is even more dire, with 1 in 8 reporting serious suicidal thoughts in the past year.[1] **According to the National Center for Health Statistics, *suicide ranks as the second leading cause of death among Americans aged 10 to 34 years.***

These statistics illustrate the urgent need for new treatment tools and interventions to address the mental health challenges faced by a substantial segment of the population.



Nearly
1 in 5 adults
(about 20%)
experiences depression[2]

BARRIERS TO MENTAL HEALTHCARE

Despite the high disease burden among the population, barriers to care have hindered those seeking treatment. Consequently, primary care has become the de facto mental healthcare system for millions of Americans.

With workforce shortfalls, inadequate insurance coverage, and high out-of-pocket costs, only half of Americans with mental illness receive treatment.[3] Of those treated, less than 20% obtain care from a mental health specialist.[4] Primary care clinicians are tasked with addressing these key barriers in access to specialized mental health services along with managing medications and mitigating adverse events.

60% of mental health treatment is provided by primary care physicians

As the front line of care, primary care physicians provide 60% of mental health treatment in the United States.[5] However, most primary care clinicians receive minimal training in mental health treatment and often lack the time and resources to manage complex psychiatric disorders. Pressed for time, clinicians frequently resort to prescribing medications as a first-line treatment option. Generalist providers prescribe over 70% of antidepressants.[6]

THE TREATMENT STATUS QUO – LOW EFFICACY AND TOLERABILITY

The conventional approach to mental health treatment, heavily reliant on medications that may be decades old (such as antidepressants and anxiolytics), often necessitates a protracted process of trial and error. **For example, up to two-thirds of patients report inadequate symptom control on their first antidepressant trial.**[7] Dose escalations or additional medication trials often yield minimal to modest treatment benefits and more often result in increased burden of side effects. Faced with medication failures, clinicians often resort to (or continue) polypharmacy, which is linked to still greater health risks.[8]

The trial and error method of psychiatric medication management is further complicated by adherence challenges:[9]

- Approximately 28% of patients discontinue their antidepressant medication within the first month.
- Discontinuance rises to 44% within three months.

Such high rates of early treatment discontinuation significantly hinder successful management of major depressive disorders and raise substantial concerns regarding the efficacy, safety, and tolerability of psychiatric medications.

The prevailing practice of psychiatric medication trial and error frequently leads to suboptimal patient outcomes, including prolonged time to remission, extended periods of disability, diminished quality of life — and, most critically, an ongoing elevated risk of suicide. A paradigm shift towards personalized, patient-centered treatment options is imperative to improving patient outcomes and transforming mental healthcare.

THE SCOPE OF ADVERSE DRUG REACTIONS

The main reason for patient treatment discontinuation is Adverse Drug Reactions (ADR). ADRs are alarmingly pervasive within mental healthcare, with far-reaching detrimental impacts on patients, clinicians, and the healthcare system:

- ADRs are the 4th leading cause of death in the United States, ahead of pulmonary disease, diabetes, AIDS, and automobile accidents.[10]
- Epidemiological studies tend to find that between third and half of ADRs are (at least potentially) preventable.[11]
- A recent study found that ADRs were observed in 21% of patients taking an antidepressant.[12]
- Approximately 4.5 million ambulatory visits related to adverse drug events occur each year in the U.S., the majority of these in outpatient office practices.[13]
- One review found that hospitalizations due to ADRs ranging between 6 to 14% with mortality rates ranging between 0.4 to 2.7%. Further, under reporting of adverse events have been cited in the literature.[14]

The economic burden associated with ADRs is likewise staggering. Preventable ADRs lead to more than $30 billion in direct healthcare costs every year.[15] Indirect costs related to disability, reduced productivity, and absenteeism likely push this figure much higher.

Despite robust medication management protocols, it's clear that new solutions are urgently needed.

THE SOLUTION: GENOTYPE-GUIDED TESTING AND PRECISION MEDICINE

The current mental health crisis, exacerbated by a shortage of primary and mental health clinicians and the challenges posed by ADRs, necessitates a critical reassessment of the outdated, inefficient methods clinicians were taught to approach psychiatric medication management.

Emerging technologies, such as genotype-guided testing and advanced medication data analytics, herald a new era in mental health treatment: precision medicine. Genotype-guided testing is the study of genetic variability in drug absorption, distribution, metabolism, excretion, and receptor targeting. This emerging field enables physicians to understand a patient's inherited ability to respond to a drug, thereby guiding personalized medication choices.[16]

Genetically-guided, data-driven tools enable clinicians to quickly tailor treatments to the individual characteristics of each patient. By leveraging these cutting-edge technologies, clinicians can make more informed decisions, potentially reducing the trial and error associated with conventional treatment methods.

Genetic variations can predict who will have improved outcomes or adverse effects on specific medications. By uncovering this critical information in a timely manner, ideally within 2-5 days before writing a prescription, physicians can better match patients with drugs likely to be safe and effective based on their genotype.

Genotype-guided testing panels are now available for many psychotropic drug classes, including:[17]

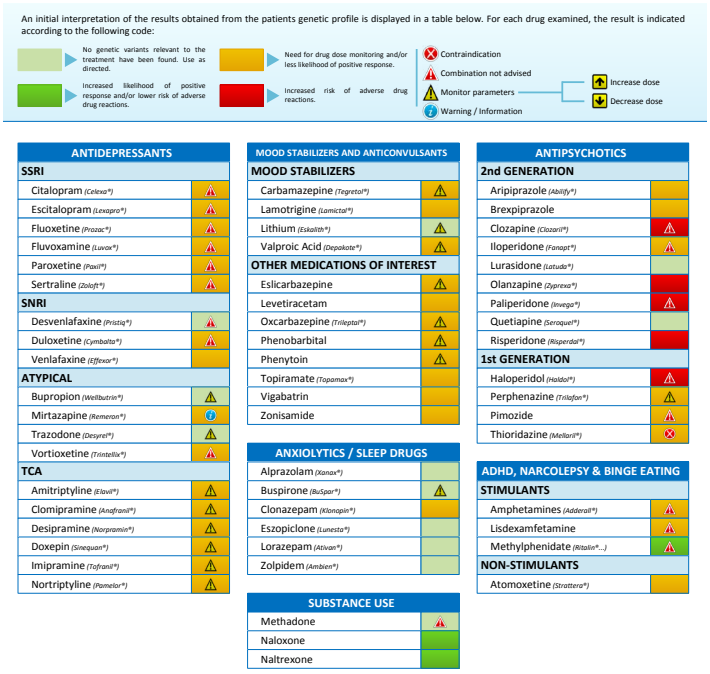
- Antidepressants (e.g., SSRIs)
- Antipsychotics
- Anxiolytics (e.g., benzodiazepines)
- Stimulants (e.g., for ADHD)
- Addiction treatment (e.g., buprenorphine)

EVIDENCE OF IMPROVED OUTCOMES

Testing panels provide an objective tool to guide clinical decision-making and reduce reliance on trial-and-error prescribing. Genotype-guided care has been found to:[18]

- Increase symptom remission rates
- Reduce time to achieve an appropriate medication regimen
- Lower medication dosage requirements
- Lessen medication switches
- Cut adverse event rates in half

By empowering clinicians to select the optimal medication for each patient, genotype-guided testing enables more effective, personalized mental healthcare in primary care settings.



HARNESSING THE POWER OF COMPREHENSIVE REPORTING

Beyond optimizing the initial prescription, ongoing monitoring of treatment response and side effects is critical to ensure patient safety and therapeutic success. However, systematic tracking of outcomes can be a challenge in busy primary care environments.[19]

Emerging digital health platforms now allow clinicians to more easily collect and analyze patient-reported outcomes over time.[20] Providers can monitor subjective measures like depression severity scales (e.g., PHQ-9) and objectively track metrics such as side effects and medication adherence.[21]

Dynamic psychogenotype-guided testing software platforms, in particular, can integrate complex analytic capabilities with an automated data-to-insight approach, significantly reducing the need for manual clinician interpretation. This type of advanced tool also allows primary care physicians to perform "what if" analysis to explore the potential outcomes for different drug combinations by altering one or more variables.

Ideally, the testing provider continually updates the reporting as new medications are researched and added to the database. Medications can be compared with the patient's existing medication regimen to determine any potential negative interactions.

This report of genotype-guided test results integrates complex analytic capabilities with an automated data-to-insight approach significantly reducing the need for manual interpretation.

CONCLUSION

Primary care clinicians have a new opportunity to address pervasive gaps in mental healthcare safety and access by leveraging emerging data-driven, genetically-guided precision medicine.

Optimizing medication selection and monitoring with genetic insights can empower primary care physicians to mitigate adverse drug events, improve treatment efficacy, and foster patient-centered care for those struggling with mental illness. As the first line of care, primary care physicians can create a positive ripple effect across the broader mental healthcare ecosystem.

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About Precision Genetics

Precision Genetics offers innovative solutions and unmatched convenience to personalize medicine for safer and more efficient well care. It is helping evolve a more modern, value-based standard of care resulting in operational efficiencies and lower overall healthcare costs.

About Neuropharmagen®

Neuropharmagen® is a genetically-guided decision support tool that streamlines the identification of personalized medication, expediting effectiveness and tolerability and enabling clinicians to provide safer and more effective treatment for patients in need. Its integration into clinical workflows has the potential to revolutionize personalized mental health treatment strategies on a broader scale.

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