

# Exploring PGx Implementation in Mental Health: The Potential for PGx as an Antipsychotic Prescribing Tool in EIP

Adam Jameson

Clinical Pharmacist | Bradford District Care NHS Foundation Trust

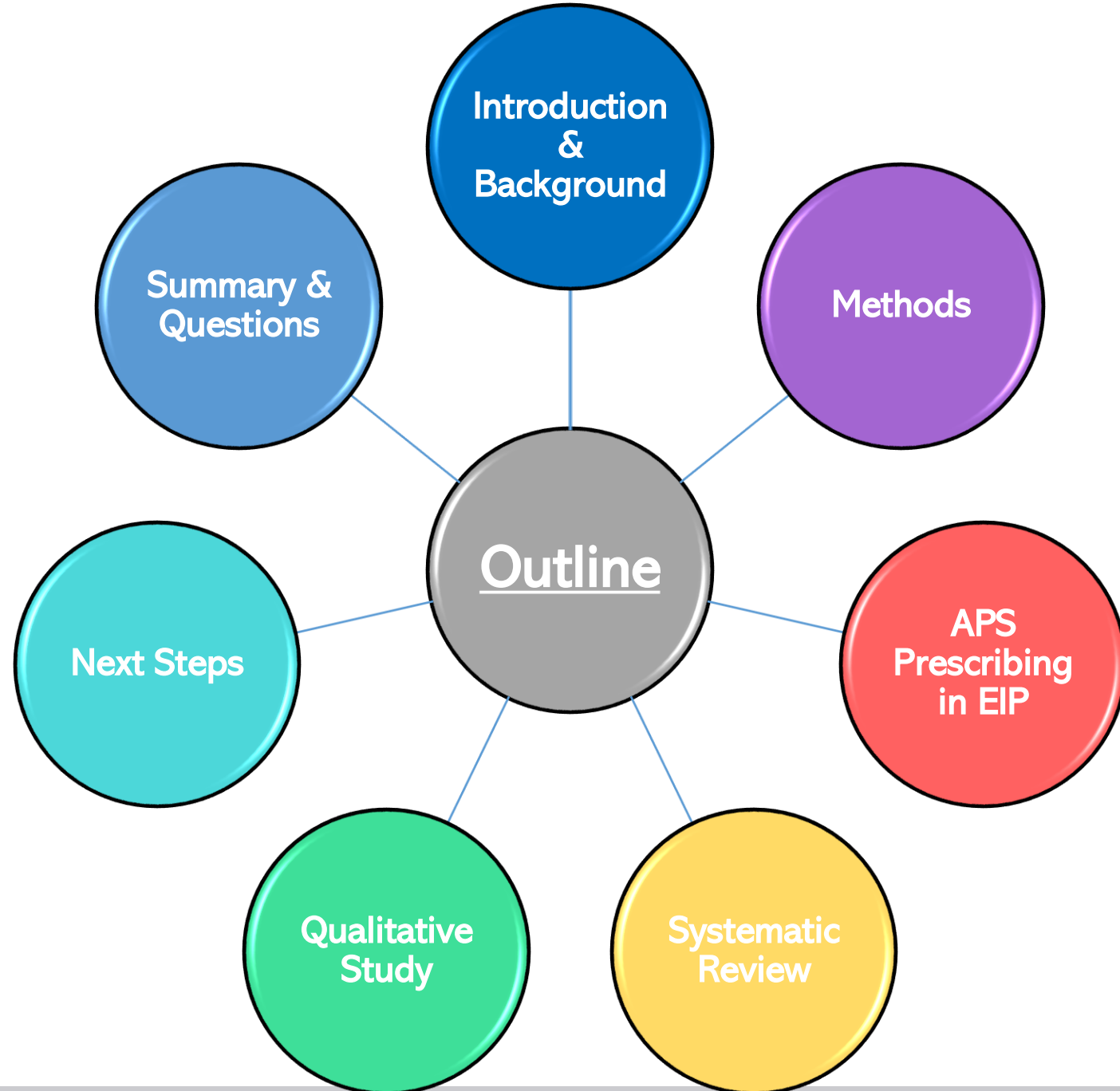
PhD Student | University of Bradford



**Bradford District Care**  
NHS Foundation Trust



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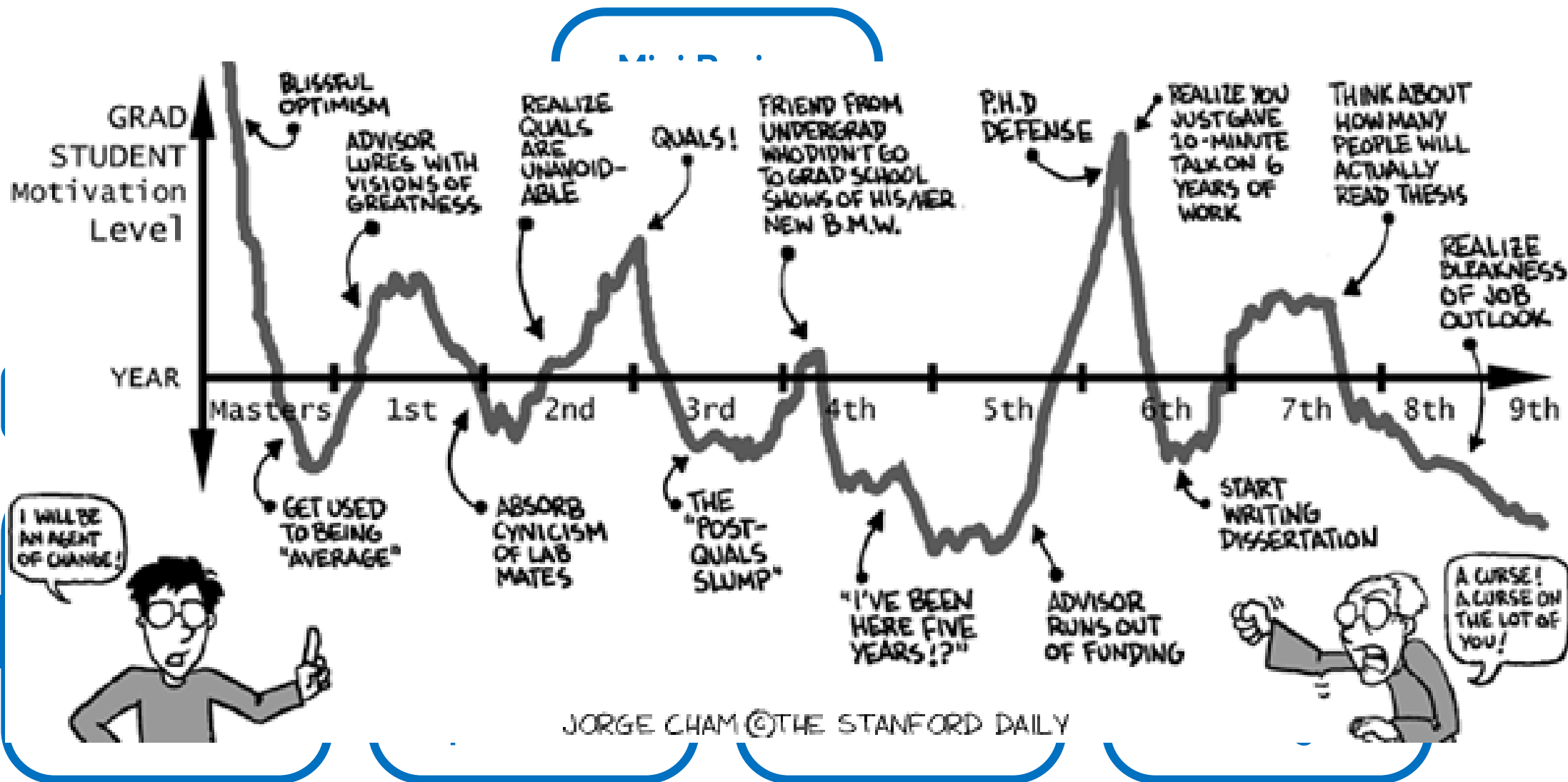


# Introduction

- **BDCT / EIP Collaborators** – Mick Mesa, Bob Collins, Gregor Russell, Jaspreet Sohal
- **UoB Collaborators** – Mohammed Faisal, Justine Tomlinson, Kristina Medlinskiene, Dane Howard, Imran Saeed
- **External Supervisors** – Caroline Dalton, Gurdeep S. Sagoo, Alastair Cardno
- **Internal Supervisors** – Greg C Bristow, Beth Fylan, & Samantha L. McLean

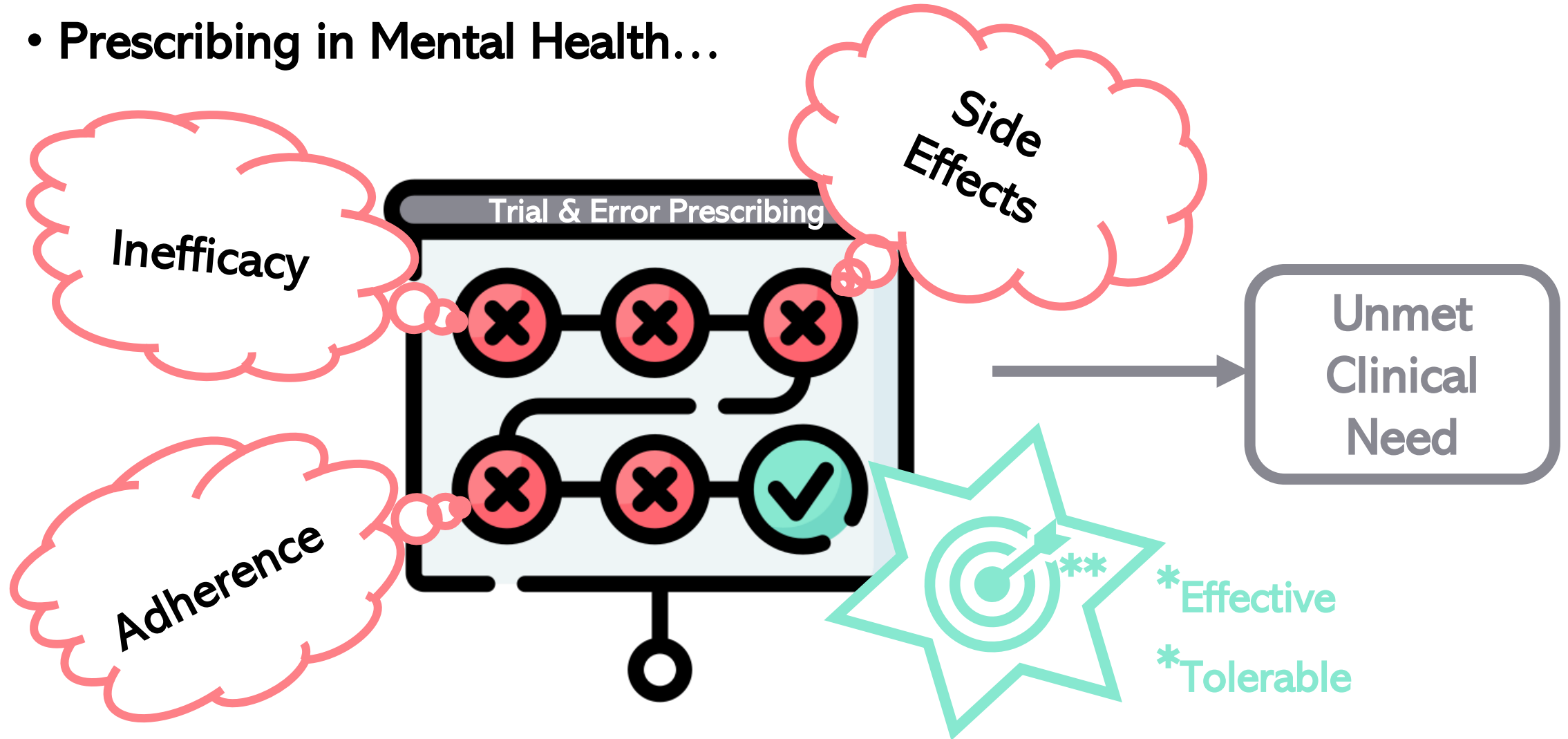


# Introduction



# Introduction

- Prescribing in Mental Health...



# Introduction

- Prescribing in EIP...what are the unique challenges?
- Younger populations
- Often antipsychotic naïve
- Weight gain
- SGAs > FGAs – and associated challenges
- Sexual dysfunction



# Introduction

- **What is PGx?**



Studies how **genetic variation** contributes to the **inter-individual response** to medicines



Intersection between **pharmacology** and **genetics**



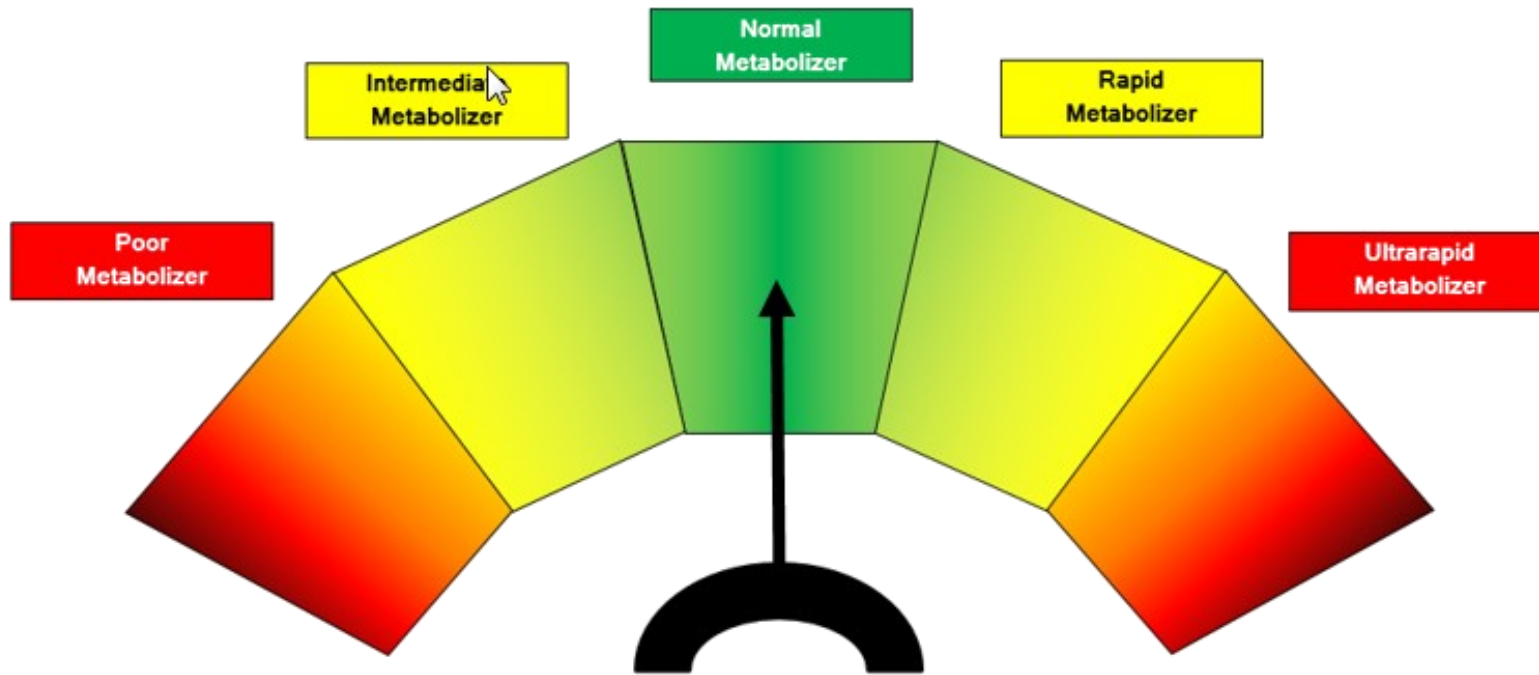
Genetic variants can impact upon a drug's **pharmacodynamics** & **pharmacokinetics**



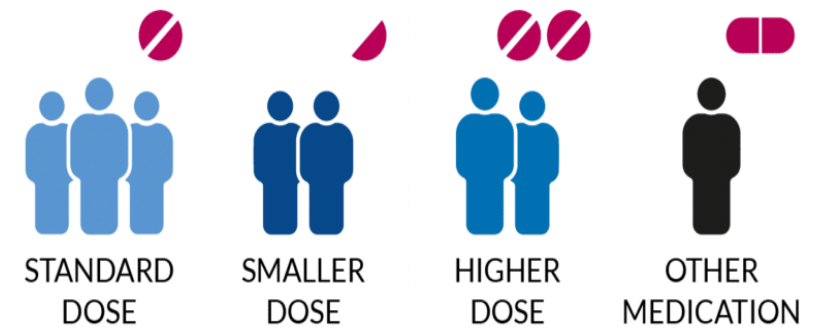
**PGx Testing** used to identify pharmacogenes by **genotyping** patient sample (saliva or blood)

# Introduction

- Why is PGx relevant in Mental Health?



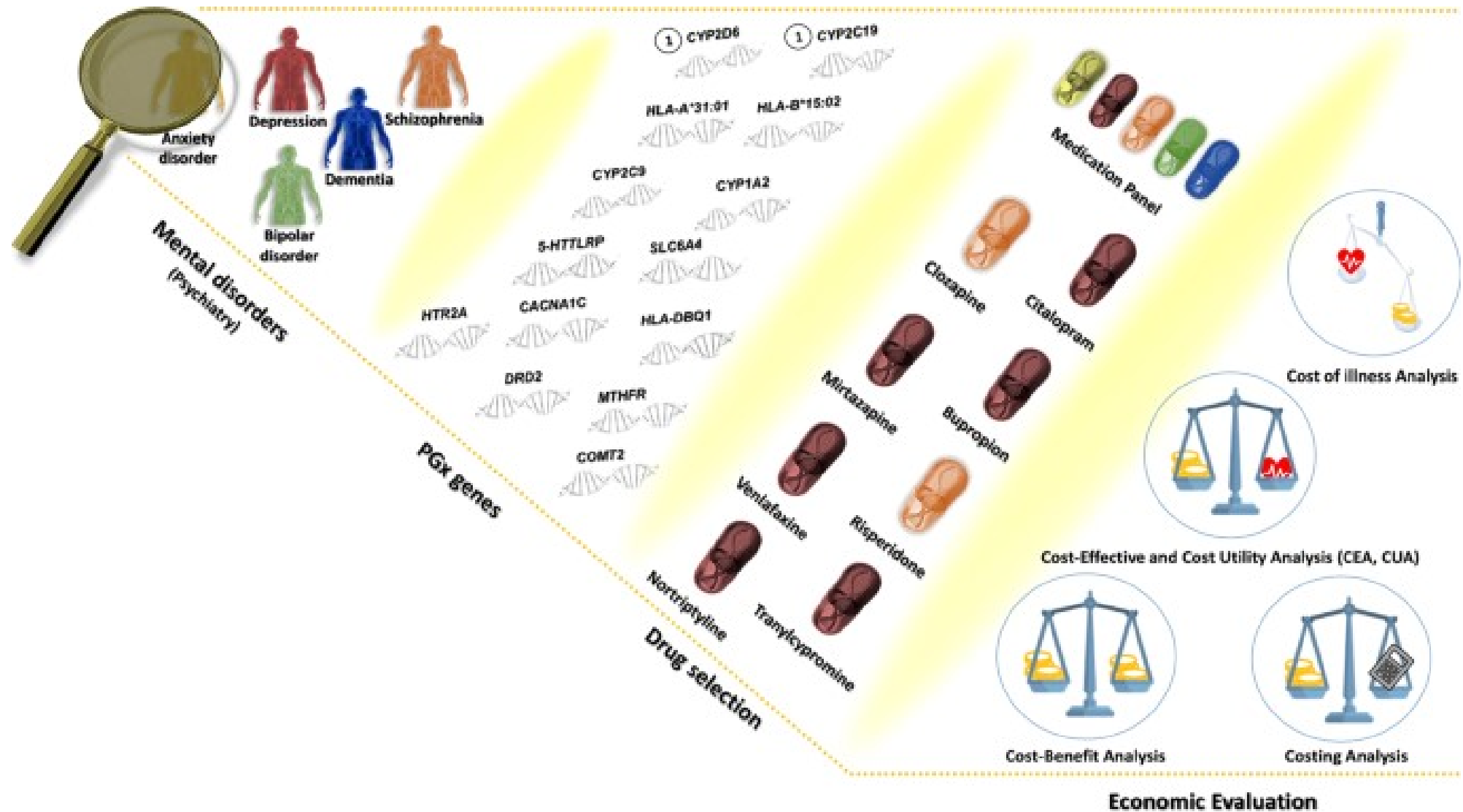
PHARMACOGENETIC TESTING



*PGx testing implementation and use in MH settings at present is limited...*



# Introduction



# Methods

- **Mixed Methods Approach**

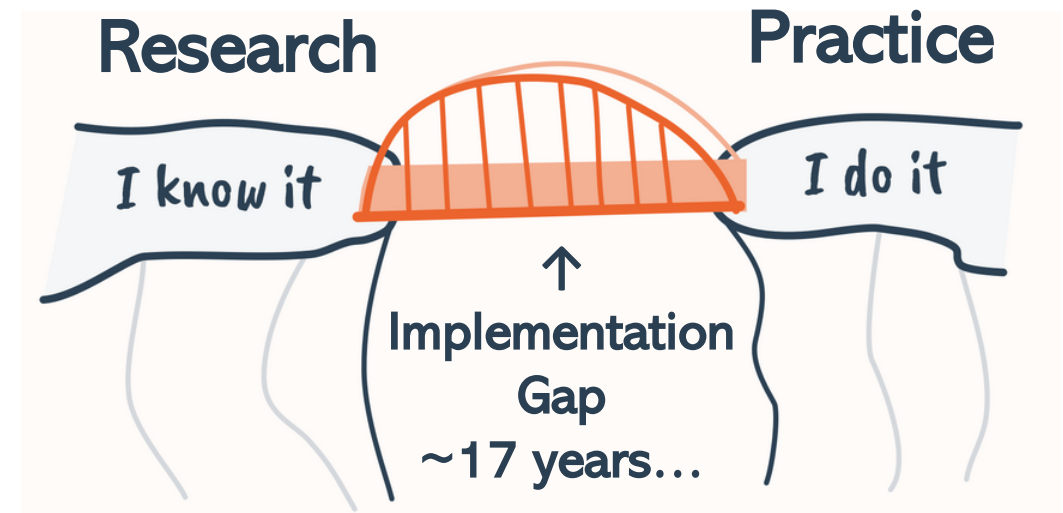


- **Pragmatic Epistemology**



# Methods

- Implementation Science
- Normalisation Process Theory



**Coherence**  
(Sense-Making)  
'What is the work?'

**Cognitive Participation**  
(Engaging)  
'Who does the work?'

**Collective Action**  
(Enacting)  
'How does the work get done?'

**Reflexive Monitoring**  
(Appraisal)  
'How is the work understood?'

Social Mechanisms that 'promote' or 'inhibit' intervention integration in clinical practice

## Aim:

Explore the potential for implementing PGx testing to support antipsychotic prescribing in EIP services

## Objectives:

- Explore barriers and facilitators to implementing PGx in MH settings
- Investigate the potential for using PGx as a prescribing tool in EIP settings
- Understand stakeholder views and perspectives towards implementing PGx in EIP settings
- Address identified gaps or challenges with implementing PGx in an EIP setting

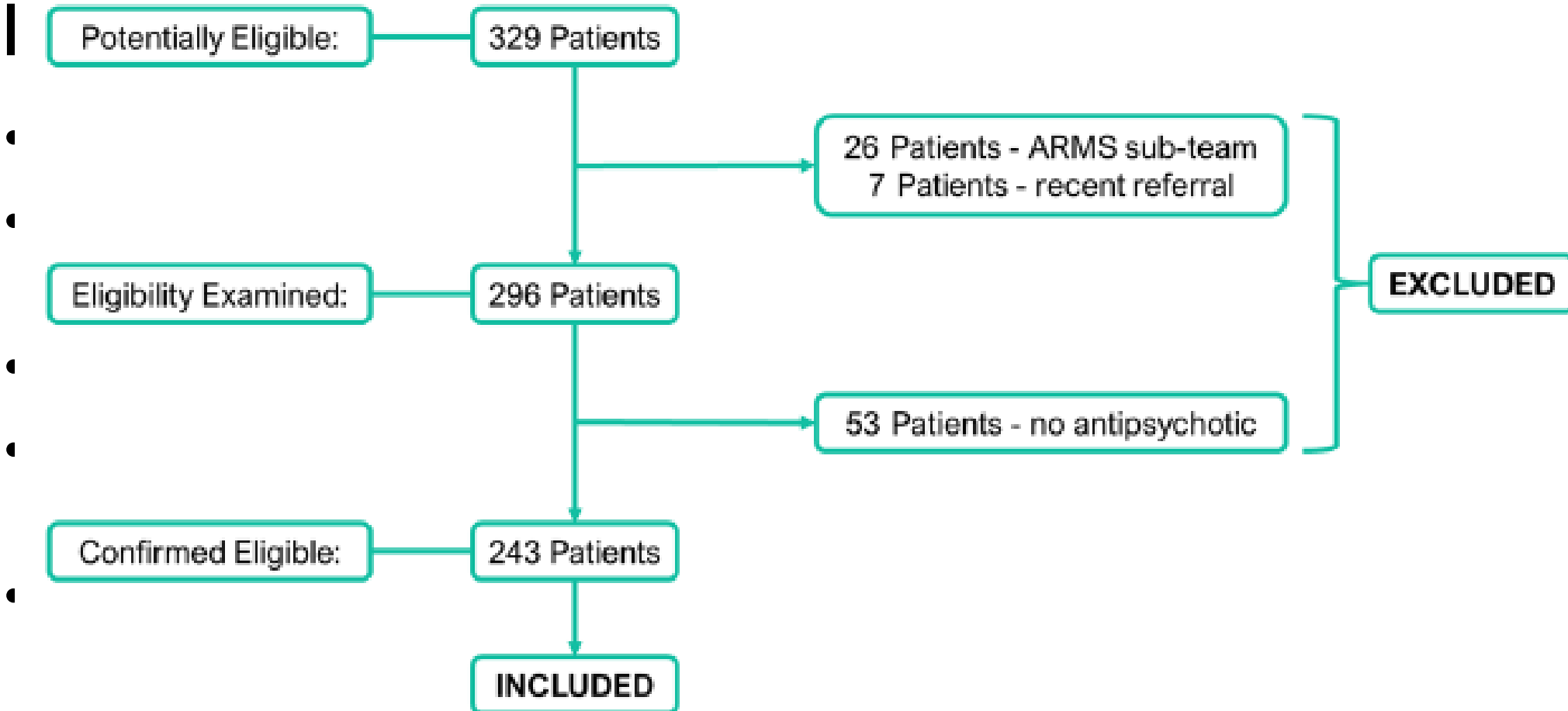
**Quantitative: PGx  
Antipsychotic Prescribing  
in EIP**

## Objectives:

Explore antipsychotic prescribing in the BDCT EIP cohort to investigate:

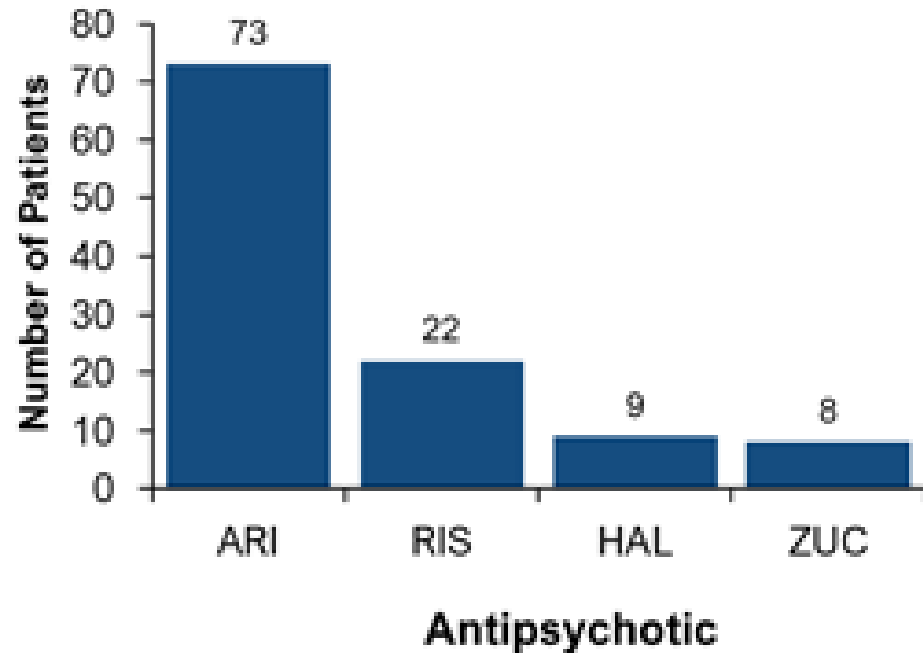
- Proportion of antipsychotics prescribed with CYP2D6 PGx associations and whether any groups more likely to be prescribed one
- Antipsychotic transitions to estimate how many patients may be eligible for PGx testing

# Antipsychotics in EIP

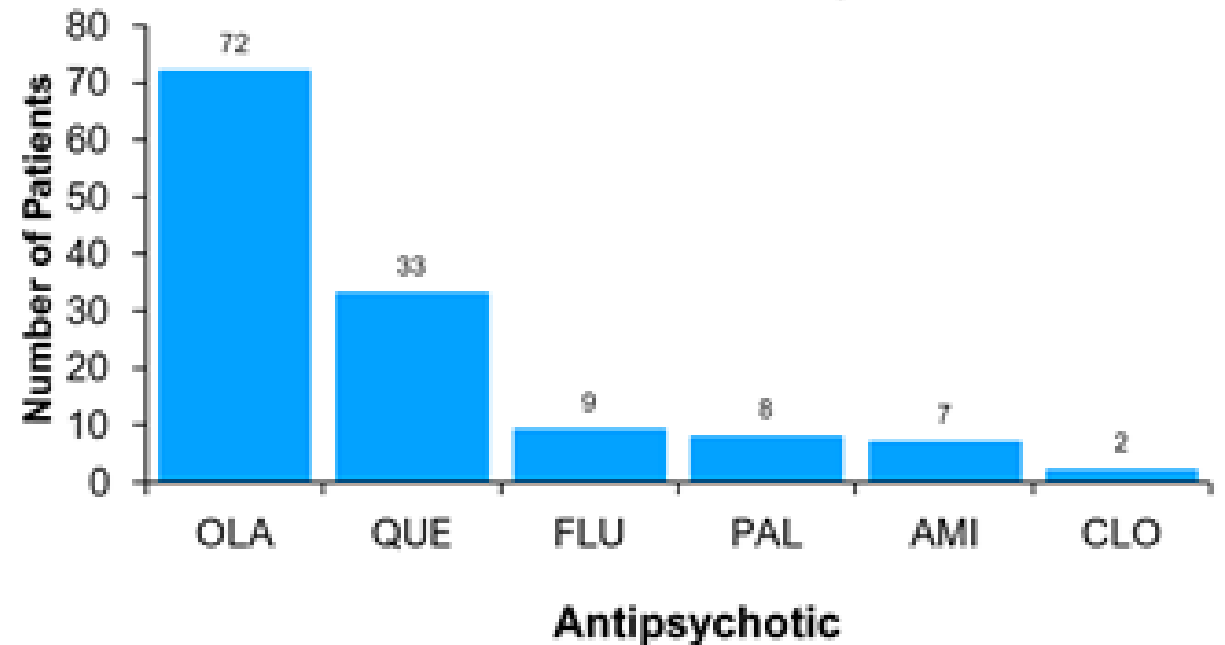


# Antipsychotics in EIP

3a – 'CYP2D6 PGx Antipsychotics'



3b – 'non-CYP2D6-PGx Antipsychotics'



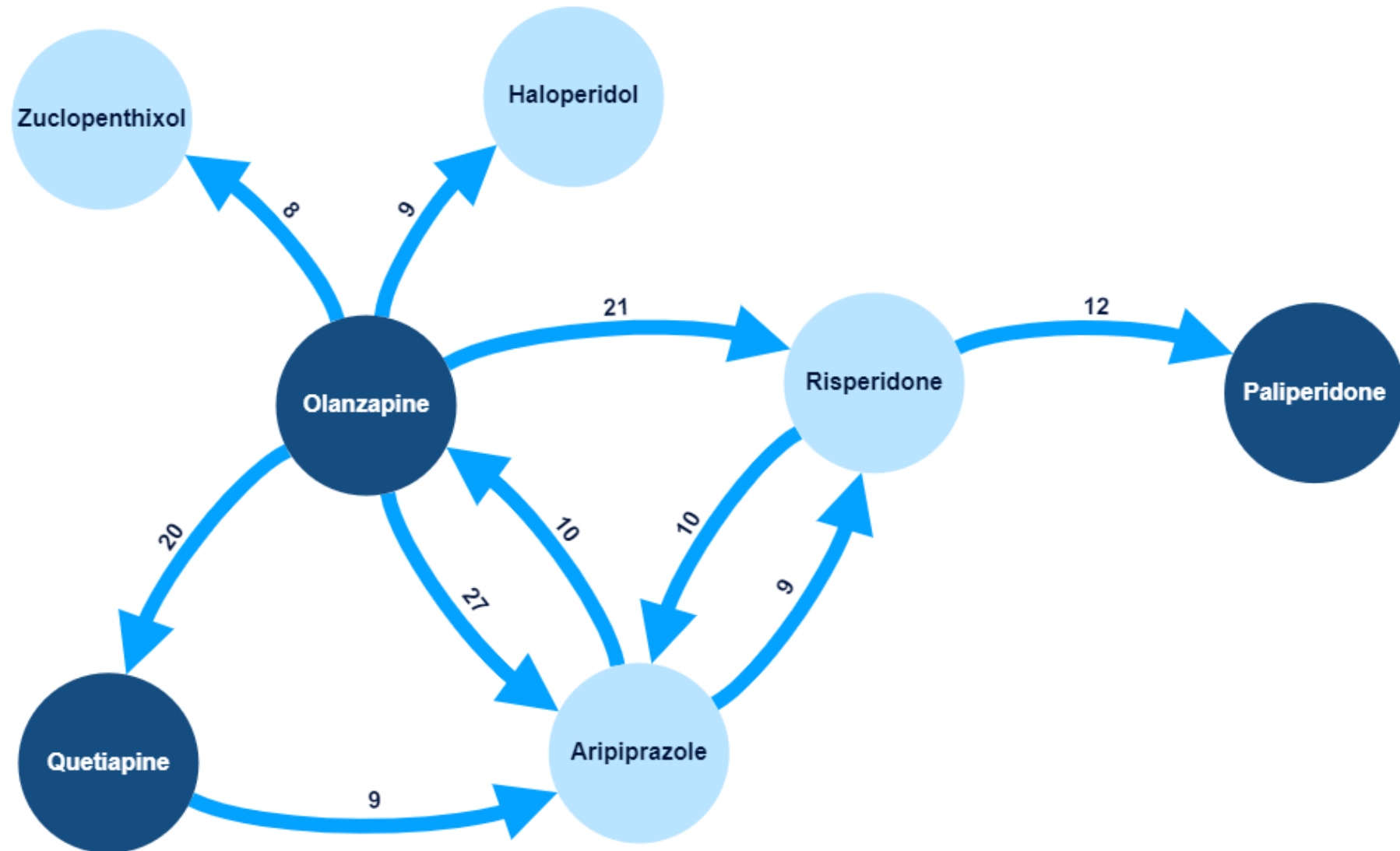
*Description: Currently prescribed antipsychotic based on PGx grouping.*

*Figure 3a: ARI = Aripiprazole, RIS = Risperidone, HAL = Haloperidol, ZUC = Zuclopenthixol,*

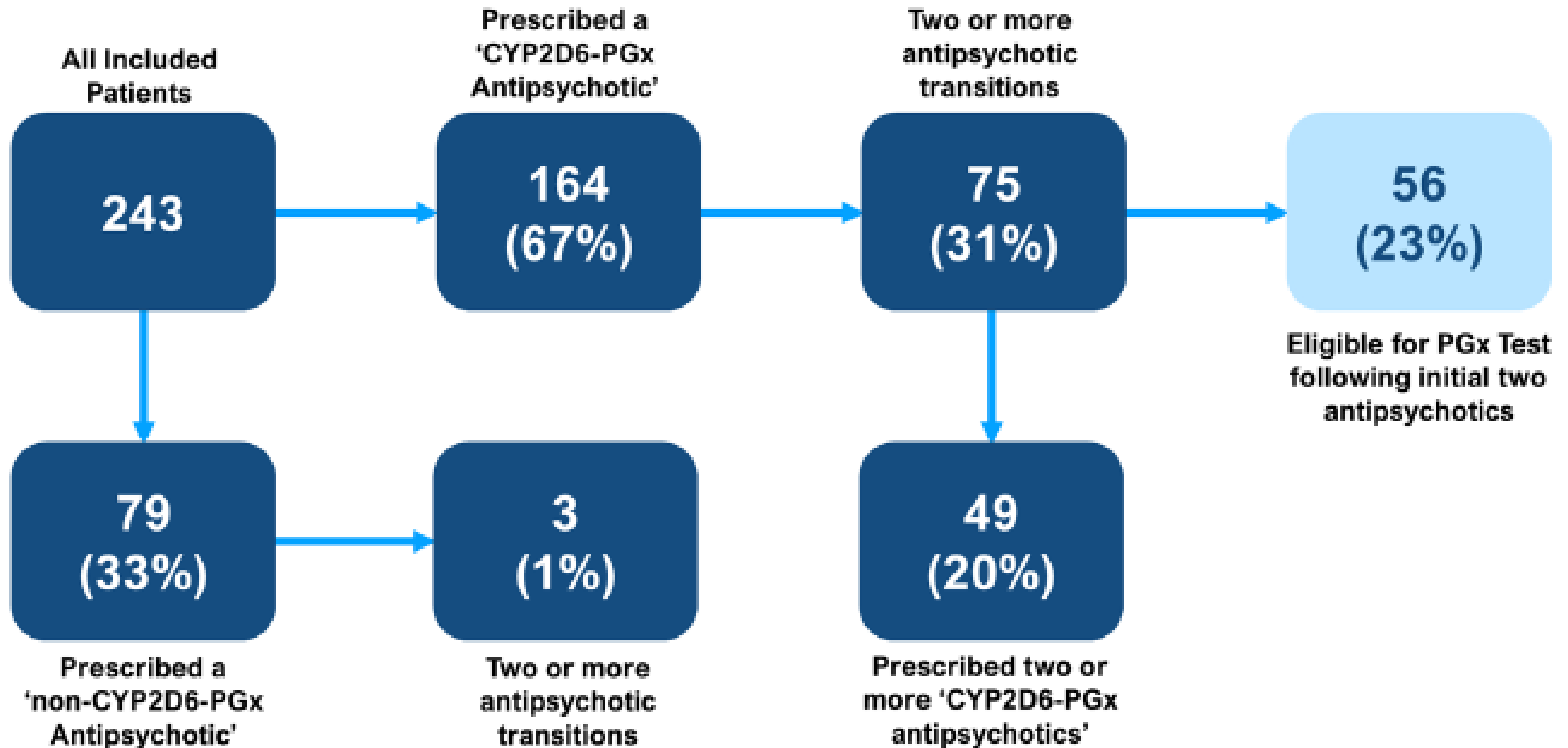
*Figure 3b: OLA = Olanzapine, QUE = Quetiapine, PAL = Paliperidone, AMI = Amisulpride, FLU = Flupentixol, CLO = Clozapine*



# Antipsychotics in EIP



# Antipsychotics in EIP





## Takeaways:

- **High levels** of prescribing '**CYP2D6-PGx Antipsychotics**'
- **Considerable** proportion of patients would be eligible for PGxT based on current guidance
- **EIP services** are ideal settings for initial rollout of PGxT in MH
- May improve **safety & effectiveness** of antipsychotic prescribing

<https://doi.org/10.1177/02698811241238283>

**\*Presented at BPS 2022 Conference & BAP 2023 Conference**

**\*\*Abstract Published from BPS 2022**

**\*\*\*BPS 2022 Poster Award Prize**

**\*\*\*\*Full Article Published JoP 2024**



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<https://doi.org/10.1177/02698811241238283>

Sage Journals

*Original Papers*



## **Proportion of Antipsychotics with CYP2D6 Pharmacogenetic (PGx) Associations Prescribed in an Early Intervention in Psychosis (EIP) Cohort: A Cross-Sectional Study**

Adam Jameson <sup>1,2,3</sup>, Muhammad Faisal<sup>3,4,5</sup>, Beth Fylan<sup>2,3,5</sup>, Greg C Bristow<sup>2</sup>, Jaspreet Sohal<sup>1</sup>, Caroline Dalton<sup>6</sup>, Gurdeep S Sagoo<sup>7</sup>, Alastair G Cardno<sup>8</sup>, and Samantha L McLean <sup>2,3</sup>

**Mixed: Systematic  
Review of Barriers and  
Facilitators to  
Implementing PGx in MH  
Settings Using NPT**



## What Are the Barriers and Enablers to the Implementation of Pharmacogenetic Testing in Mental Health Care Settings?

*Adam Jameson<sup>1,2,3\*</sup>, Beth Fylan<sup>2,3,4</sup>, Greg C. Bristow<sup>2</sup>, Gurdeep S. Sagoo<sup>5,6</sup>, Caroline Dalton<sup>7</sup>, Alastair Cardno<sup>8</sup>, Jaspreet Sohal<sup>1</sup> and Samantha L. McLean<sup>2,3</sup>*

OPEN ACCESS

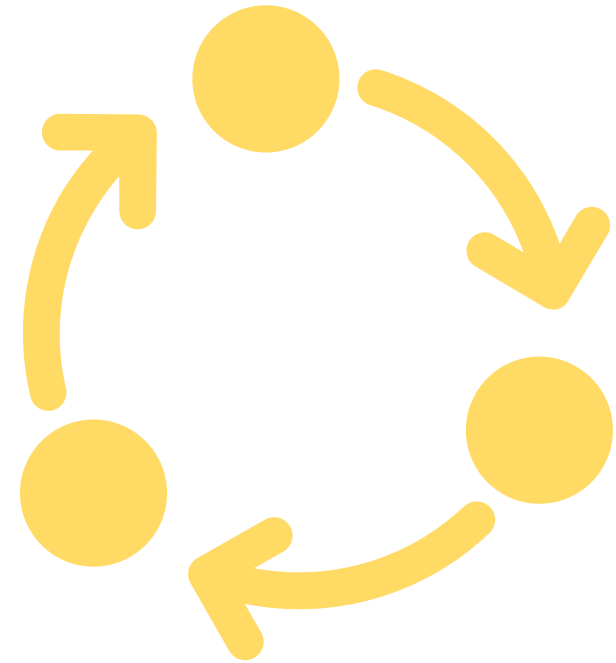


To explore factors influencing the implementation of PGx in mental health settings, using NPT as a theoretical framework.

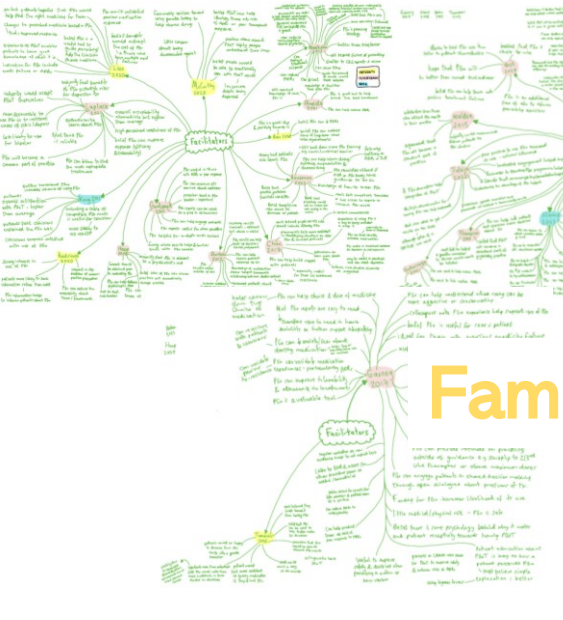
- Identify **barriers** hindering the uptake of PGx.
- Determine **facilitators** helping the adoption of PGx prescribing practices.
- Map key barriers and facilitators to constructs of the **NPT framework**

# Systematic Review

- **Search Strategy** – ‘pharmacogenomics’, ‘mental health’, and ‘perspectives’ on MEDLINE, EmBase, PsycInfo, & Scopus
- **Screening** – (1) Title, (2) Abstract, & (3) Full-Text
- **Eligibility Criteria**
- **Data Extraction & QA** – MS Excel Extraction Tool
- **Data Synthesis** – next slides







1

# Familiarisation

3

# Summarising

4

# Theme Construction (1)



# Tabulation

2

2

# Theme Construction (2)

5

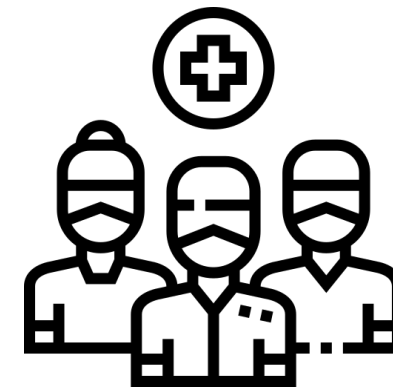
1. COHERENCE	2. COGNITIVE PARTICIPATION	3. COLLECTIVE ACTION	4. REFLEXIVE MONITORING
<p><b>1. COHERENCE</b> → The extent and nature of understanding that individuals (patients) have of their own condition and the condition of others (patients) in the same situation.</p> <ul style="list-style-type: none"> <li>Patients with low coherence may not understand the purpose of their treatment.</li> <li>Patients with high coherence are more likely to understand the purpose of their treatment.</li> </ul>	<p><b>2. COGNITIVE PARTICIPATION</b> → The extent to which patients are involved in their own care and the care of others (patients) in the same situation.</p> <ul style="list-style-type: none"> <li>Patients with low cognitive participation may not be involved in their own care.</li> <li>Patients with high cognitive participation are more likely to be involved in their own care.</li> </ul>	<p><b>3. COLLECTIVE ACTION</b> → The extent to which patients are involved in the care of others (patients) in the same situation.</p> <ul style="list-style-type: none"> <li>Patients with low collective action may not be involved in the care of others.</li> <li>Patients with high collective action are more likely to be involved in the care of others.</li> </ul>	<p><b>4. REFLEXIVE MONITORING</b> → The extent to which patients are involved in monitoring their own condition and the condition of others (patients) in the same situation.</p> <ul style="list-style-type: none"> <li>Patients with low reflexive monitoring may not be involved in monitoring their own condition.</li> <li>Patients with high reflexive monitoring are more likely to be involved in monitoring their own condition.</li> </ul>

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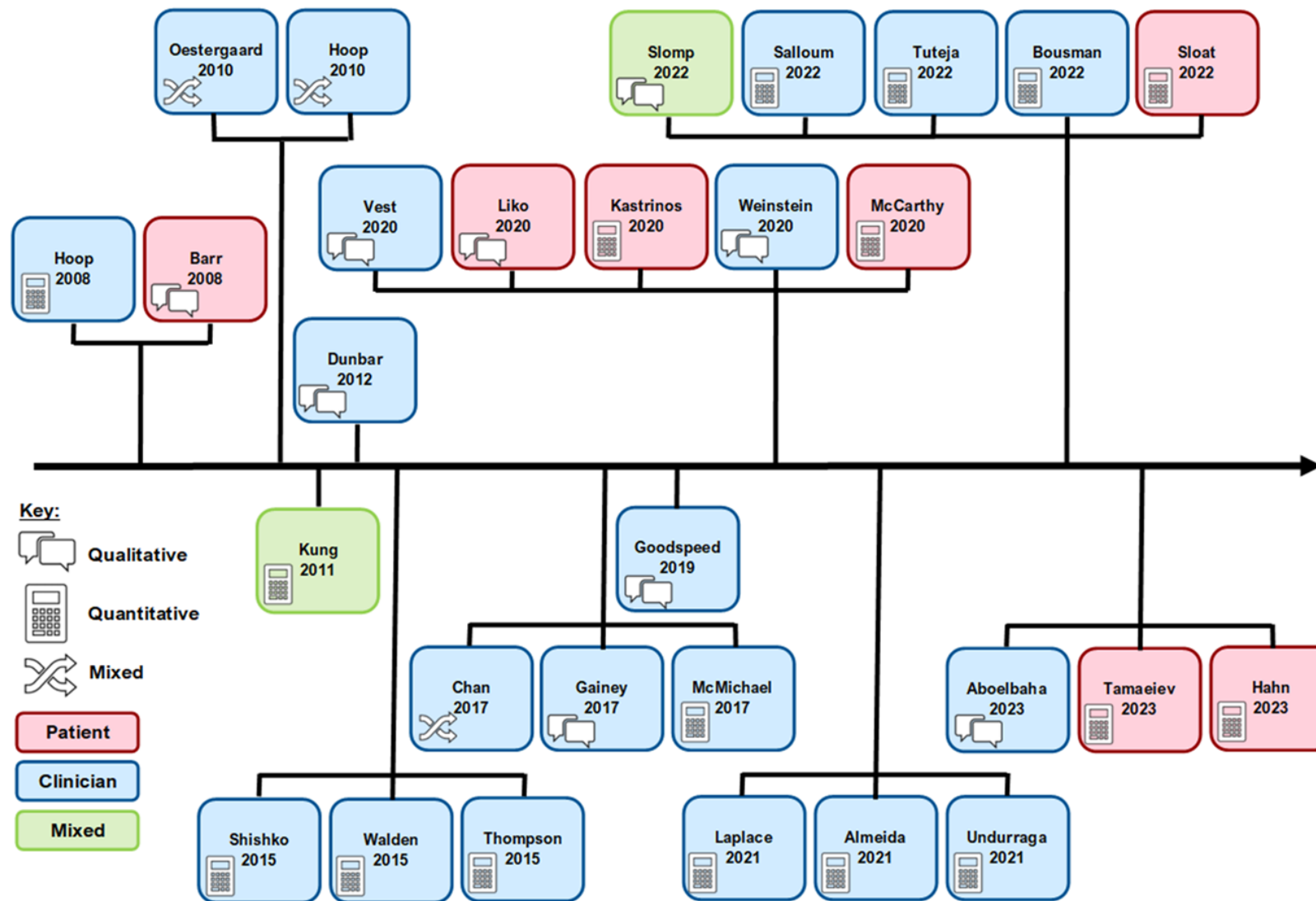
Barriers	Facilitators	Collaborative Action	Reflexive Monitoring
<p><b>1. Barriers</b></p> <ul style="list-style-type: none"> <li>Patients with low coherence may not understand the purpose of their treatment.</li> <li>Patients with low cognitive participation may not be involved in their own care.</li> <li>Patients with low collective action may not be involved in the care of others.</li> <li>Patients with low reflexive monitoring may not be involved in monitoring their own condition.</li> </ul>	<p><b>2. Facilitators</b></p> <ul style="list-style-type: none"> <li>Patients with high coherence are more likely to understand the purpose of their treatment.</li> <li>Patients with high cognitive participation are more likely to be involved in their own care.</li> <li>Patients with high collective action are more likely to be involved in the care of others.</li> <li>Patients with high reflexive monitoring are more likely to be involved in monitoring their own condition.</li> </ul>	<p><b>3. Collaborative Action</b></p> <ul style="list-style-type: none"> <li>Patients with high collective action are more likely to be involved in the care of others.</li> </ul>	<p><b>4. Reflexive Monitoring</b></p> <ul style="list-style-type: none"> <li>Patients with high reflexive monitoring are more likely to be involved in monitoring their own condition.</li> </ul>

# Systematic Review

- 29 included papers conducted across 25 countries
- Qualitative / Quantitative / Mixed-methods studies
- Pre-, post-, during-implementation
- Mix of HCP (psychiatrist, nurse & pharmacist) & patient perspectives



# Systematic Review



# Systematic Review

NPT	Facilitators	Barriers
Coherence	<p>Perception that PGx is a tool that offers an <b>improved approach to prescribing</b>, that can help <b>guide prescribing decisions</b> to yield many <b>potential benefits</b> for patients, clinicians, &amp; healthcare systems</p> <p><b>PGx information &amp; counselling</b> may enable patients to feel <b>more informed</b> about medication, <b>more involved in SDM</b>, &amp; <b>validate previous medication response</b></p> <p>Experience of using PGx helps <b>build understanding</b> of what PGx requires</p>	<p><b>Lack of understanding</b> about what PGx, its purpose, &amp; potential benefits of PGx</p> <p>Belief that <b>PGx lacks current evidence base</b> to support clinical utility &amp; is <b>not cost-effective</b></p> <p>Concern <b>PGx may cause distress</b> &amp; is an <b>extension of medical model of psychiatry</b></p>
Cognitive Participation	<p><b>Strong interest</b> in the use of PGx due to belief it will yield benefits</p> <p><b>HCPs are keen to collaborate</b> on PGx implementation, with a belief that <b>pharmacists are key</b> to this and perception amongst pharmacists PGx is part of their expanding clinical role</p> <p>Consensus about <b>tasks needed</b> to sustain PGx &amp; a belief that <b>integration into electronic health records</b> enables these tasks</p> <p>Patient education believed to be essential to <b>informing patients &amp; managing their expectations</b> of PGx</p>	<p>Some psychiatrists perceived <b>themselves &amp; others</b> in the profession to <b>lack the skills/knowledge</b> required to utilise PGx</p> <p>Some psychiatrists believed they were <b>not adequately positioned</b> to drive forward PGx implementation</p> <p><b>Ethical concerns</b> around <b>consent &amp; storage</b> of genetic data</p> <p>Issues raised about <b>clinician capacity</b> to complete PGx tasks</p>
Collective Action	<p>Perception <b>PGx is safe &amp; reliable</b> and when <b>appropriately delivered</b> can <b>inform prescribing</b>, <b>build patient rapport</b>, and will become a <b>standard part of practice</b></p> <p>Belief that developing a <b>broader PGx policy</b>, <b>psychiatry specific guidelines</b> &amp; <b>adopting local PGx champions</b> would help improve the implementation climate</p> <p>Clinicians are <b>enthusiastic to learn</b> about PGx and relevant <b>training &amp; experience</b> can help clinicians <b>feel more confident</b> to use PGx</p> <p><b>Pharmacists were confident</b> in completing <b>PGx related tasks</b></p> <p>Depressed patients have the <b>psychological capacity</b> to deal with PGx results</p>	<p>PGx could create an <b>extra burden</b> during prescribing &amp; risks causing distress to patients</p> <p><b>PGx knowledge &amp; expertise gap</b> among clinicians in part due to a <b>lack of basic &amp; specialised PGx training</b></p> <p><b>Perceived lack of internal/external policy</b> on psychiatry PGx and a <b>lack of guidance &amp; resources</b> to help implementation</p> <p>Belief that <b>HCPs lack PGx expertise</b> &amp; <b>lack of confidence</b> in PGx as an intervention</p> <p><b>Perceived lack of patient education &amp; awareness</b> of PGx</p>

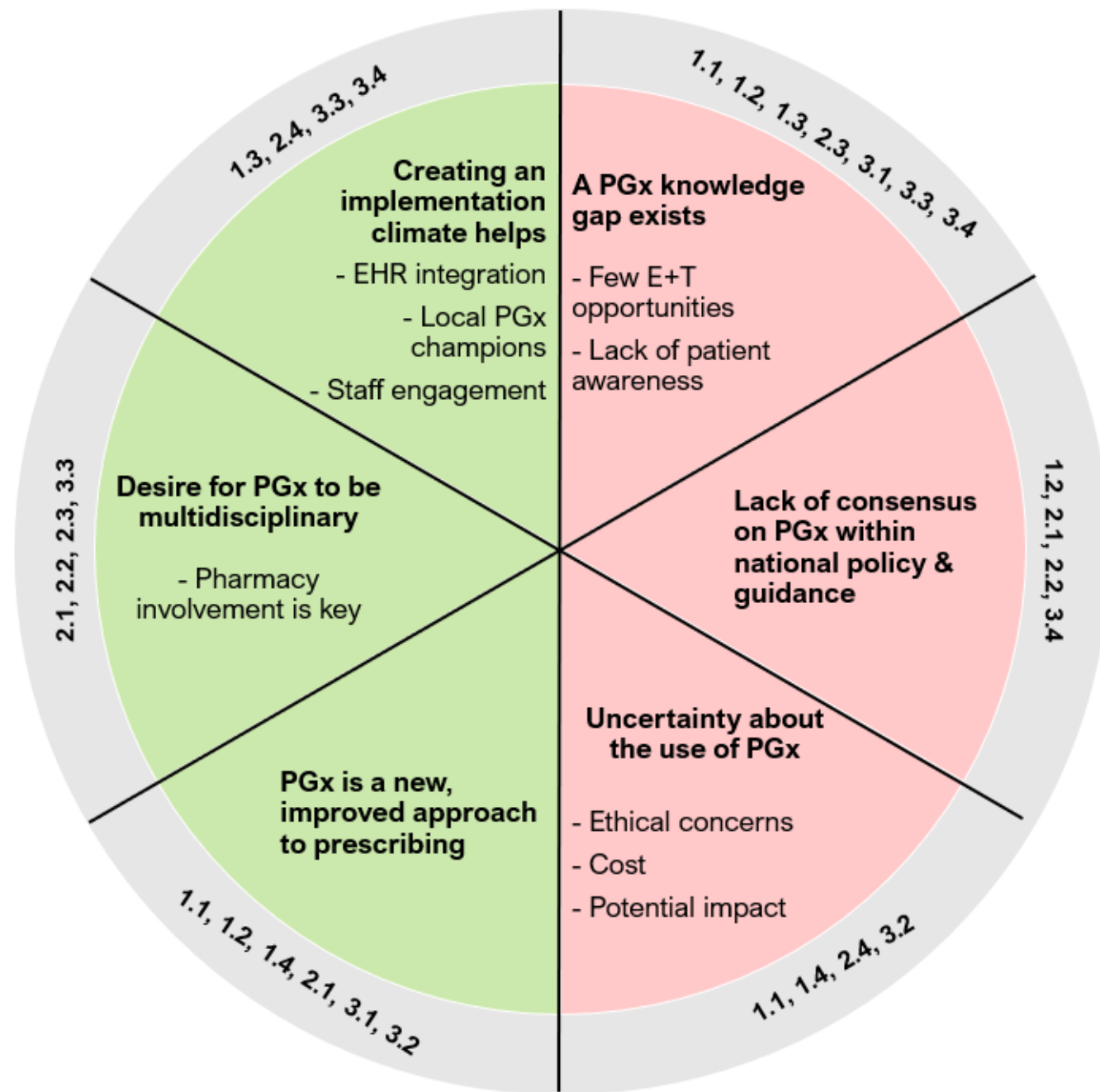
# Systematic Review

## Barriers

- A PGx knowledge gap exists
- Lack of Consensus in national policy and guidance
- Uncertainty towards the use of PGx

## Facilitators

- Creating an implementation climate helps
- Desire for PGx to be multidisciplinary
- PGx is a new, improved prescribing approach



# Systematic Review



- Range of Bs/Fs across NPT Constructs – except in **‘reflexive monitoring’**
- **E+T** is key but why?
- A **policy on PGx in MH** is required...
- Creating an **implementation climate**
- **Limitations** – antidepressants focus, poor quality studies, different PGx models

**\*Presented at HSRPP 2024 Conference**





**\*\*Abstract Published in IJPP**

**\*\*Published in Journal of Personalized Medicine**



*Systematic Review*

## Normalising the Implementation of Pharmacogenomic (PGx) Testing in Adult Mental Health Settings: A Theory-Based Systematic Review

Adam Jameson <sup>1,2,3</sup> , Justine Tomlinson <sup>2</sup>, Kristina Medlinskiene <sup>2,4</sup>, Dane Howard <sup>2,5</sup>, Imran Saeed <sup>2,5</sup>, Jaspreet Sohal <sup>1</sup>, Caroline Dalton <sup>6</sup> , Gurdeep S. Sagoo <sup>7</sup>, Alastair Cardno <sup>8</sup>, Greg C. Bristow <sup>2</sup>, Beth Fylan <sup>2,3,9</sup>  and Samantha L. McLean <sup>2,3,\*</sup> 

<sup>1</sup> Bradford District Care NHS Foundation Trust, Bradford BD18 3LD, UK

<sup>2</sup> School of Pharmacy & Medical Sciences, University of Bradford, Bradford BD7 1DP, UK

<sup>3</sup> Wolfson Centre for Applied Health Research, Bradford BD9 6RJ, UK

<sup>4</sup> Pharmacy Department, Hull University Teaching Hospitals NHS Trust, Hull HU3 2JZ, UK

<sup>5</sup> Leeds Teaching Hospitals NHS Foundation Trust, Leeds LS9 7TF, UK

<sup>6</sup> Biomolecular Sciences Research Centre, Sheffield Hallam University, Sheffield S1 1WB, UK

<sup>7</sup> Population Health Sciences Institute, Newcastle University, Newcastle NE2 4HH, UK

<sup>8</sup> Leeds Institute of Health Sciences, Faculty of Medicine and Health, University of Leeds, Leeds LS2 9LH, UK

<sup>9</sup> NIHR Yorkshire & Humber Patient Safety Research Collaboration, Bradford BD9 6RJ, UK

\* Correspondence: s.l.mclean@bradford.ac.uk

<https://doi.org/10.3390/jpm14101032>

**Qualitative: Exploring  
Stakeholder Views  
Towards PGx  
Implementation in EIP  
Settings Using NPT**



# Qualitative Study

## **Aim:**

- What are EIP stakeholder views towards the use of PGx within EIP services?

## **Objectives:**

- Explore staff, service user, and carer understanding of PGx testing and its potential application in EIP settings.
- Investigate EIP MDT members attitudes towards implementing and using PGx in EIP services.
- Identify EIP service user and carer acceptability towards and views about implementing PGx testing in EIP services.
- Explore the preferences of EIP MDT members for implementing PGx testing in EIP settings.
- Determine the needs of EIP service users and carers in relation to the use of PGx testing.

# Qualitative Study

- **Qualitative Approach**
- **NPT used as a theoretical underpinning** – to develop the topic guide and during data analysis
- **Eligibility Criteria**
- **Recruitment** – Sept '23 to March '24 across BDCT, RDaSH & LYPFT EIP sites



# Qualitative Study

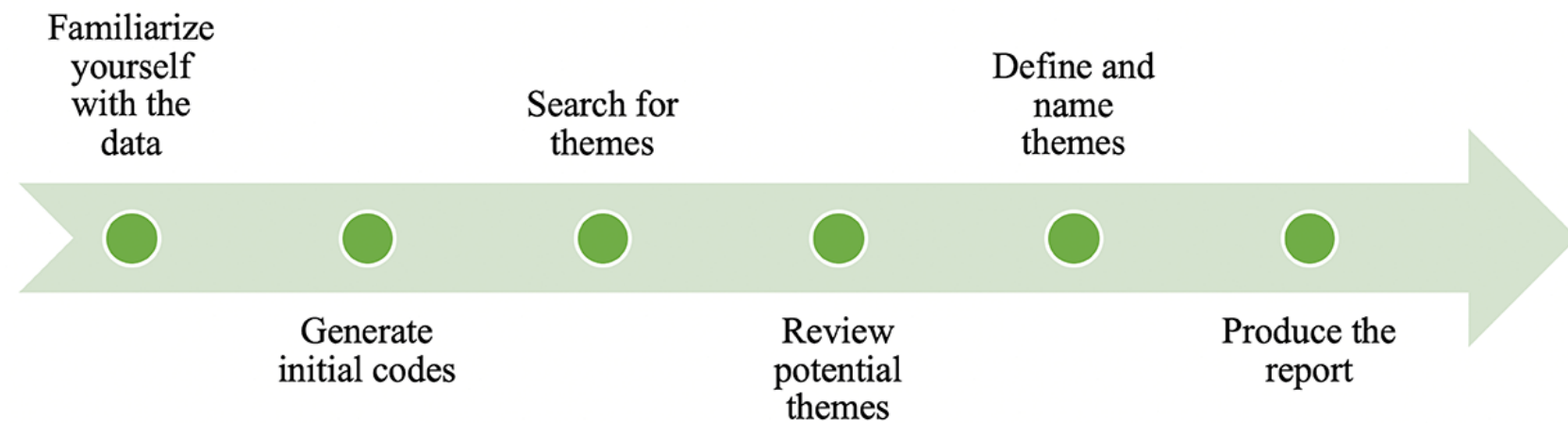
## Data Collection

- Service Users – 12 x semi-structured interviews
- Staff – 4 x focus groups (18 staff members)
- Carers – 1 x focus group (3 carers)



## Data Analysis

- Reflexive Thematic Analysis
- NVivo 12 used to facilitate code management and theme organisation



# Qualitative Study

## PGx in a Complex Care Context

- Experiences & Perceptions of Psychosis & Antipsychotics
- Roles & Involvement in Care

## Making Sense of PGx

- What is PGx Anyway?
- How is PGx Different?

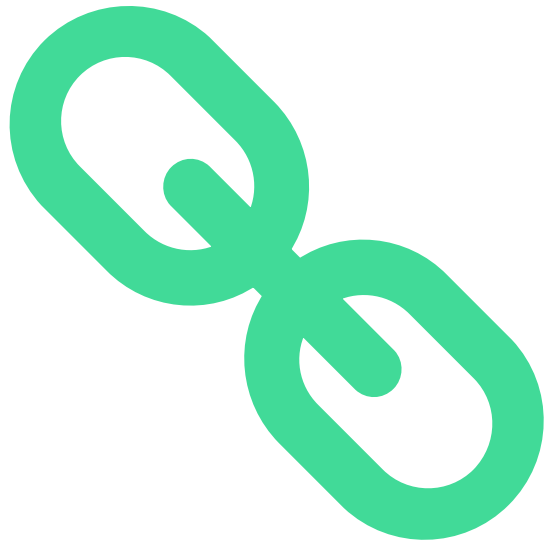
## Timing PGx Right (it just depends)

## PGx Concerns Me Because...

## PGx in Practice

- PGx E&T
- Who is Involved in PGx?
- Delivering & Reviewing PGx

# Qualitative Study



- How do these findings link to NPT?

## Qualitative Study

**\*Presented at PRIMM 2024 Conference**

**\*\*Poster Award Prize at PRIMM 2024**

- **Interest** in PGx, but **timing** of offering PGx in psychosis is key
- **Poor initial** understanding of PGx but participants able to see similarities
- Implementation in EIP is **complex**
- Range of **concerns** to be addressed and **preferences** to be harnessed



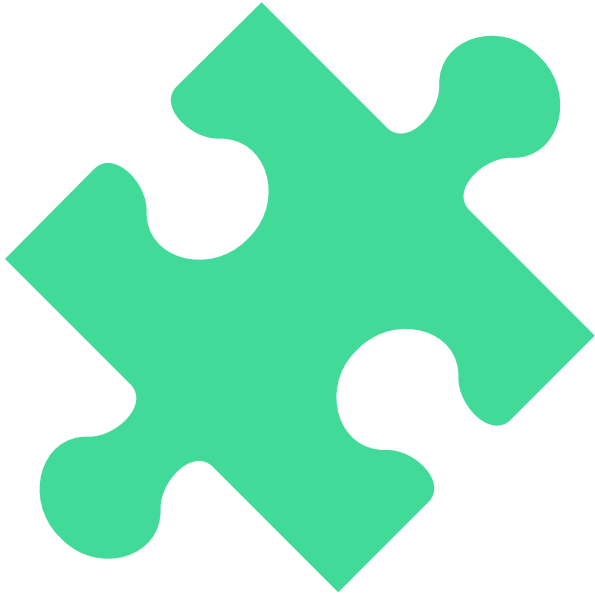
## **A qualitative exploration of patient views towards the implementation of pharmacogenetic (Pgx) testing in early intervention in psychosis (Eip) services**

Jameson A.<sup>\*1,2,3</sup>, Fylan B.<sup>2,3,7</sup>, Bristow G.B.<sup>2</sup>, Sohal J.<sup>1</sup>, Dalton C.<sup>4</sup>, Sagoo G.S.<sup>5</sup>, Cardno A.<sup>6</sup>, McLean S.L.<sup>2,3</sup>

<sup>1</sup>Bradford District Care NHS Foundation Trust; <sup>2</sup>School of Pharmacy & Medical Sciences, University of Bradford; <sup>3</sup>Wolfson Centre for Applied Health Research, Bradford; <sup>4</sup>Biomolecular Sciences Research Centre, Sheffield Hallam University; <sup>5</sup>Population Health Sciences Institute, Newcastle University; <sup>6</sup>Leeds Institute of Health Sciences, Faculty of Medicine and Health, University of Leeds; <sup>7</sup>Bradford Institute of Health Research, Yorkshire & Humber PSTRC

<https://doi.org/10.1002/pds.5859>

# Qualitative Study



- Next steps...
- MH Pharmacists in EIP
- MH Pharmacists generally



## Next Steps

### Co-Design – ‘EngagePGx’ Implementation Package

Exploring PGx implementation further:

- Test ‘EngagePGx’ package
- **Complex intervention development**
- PGx in **deprescribing psychotropics**
- PGx **process evaluation**
- **Pilot & Feasibility** test PGx in EIP
- Explore **Pharmacy** role in PGx in MH

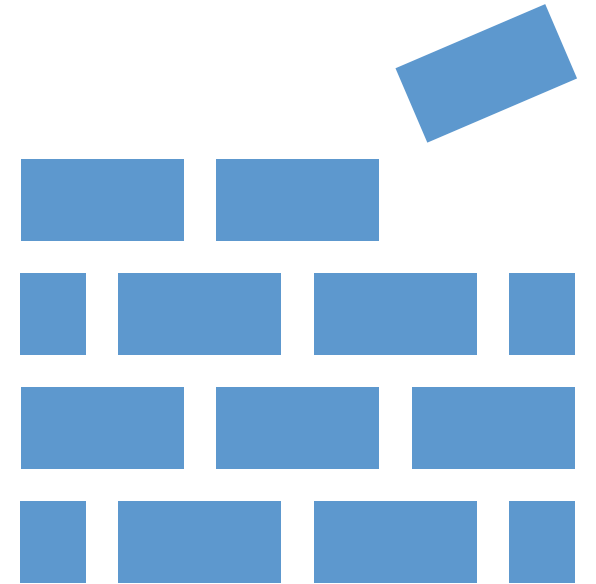


## Summary & Questions

**Mixed methods** approach taken to explore PGx implementation in MH – particularly to support **antipsychotic** prescribing in **EIP**

PGx has **potential** for use in EIP and stakeholders are **intrigued** about its implementation, yet **many factors** are at play

**More questions than answers...**



# Questions

Thank you for Listening  
Any Questions?

[a.jameson@bradford.ac.uk](mailto:a.jameson@bradford.ac.uk)



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