Connecting Pharmacogenomics, Practice Research, and Community Pharmacy Practice

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Learning Objectives

1. Understand the evolving scope of pharmacy practice and the changing healthcare landscape in Canada.

1. Review key principles of pharmacogenomics and the use of test results to optimize therapy.

1. Discuss strategies for integrating pharmacogenetic testing into community pharmacy practice.

1. Summarize evidence from recent practice research demonstrating the value of pharmacogenetic testing.

Challenges With Canadian Access To Care

Canadians with acute and chronic conditions are forced to seek other parts of the healthcare systems.

Access to primary care is a major challenge in Canada, resulting in large volumes of non-urgent cases in the ER.

6M+ do not have Family Physicians[1]

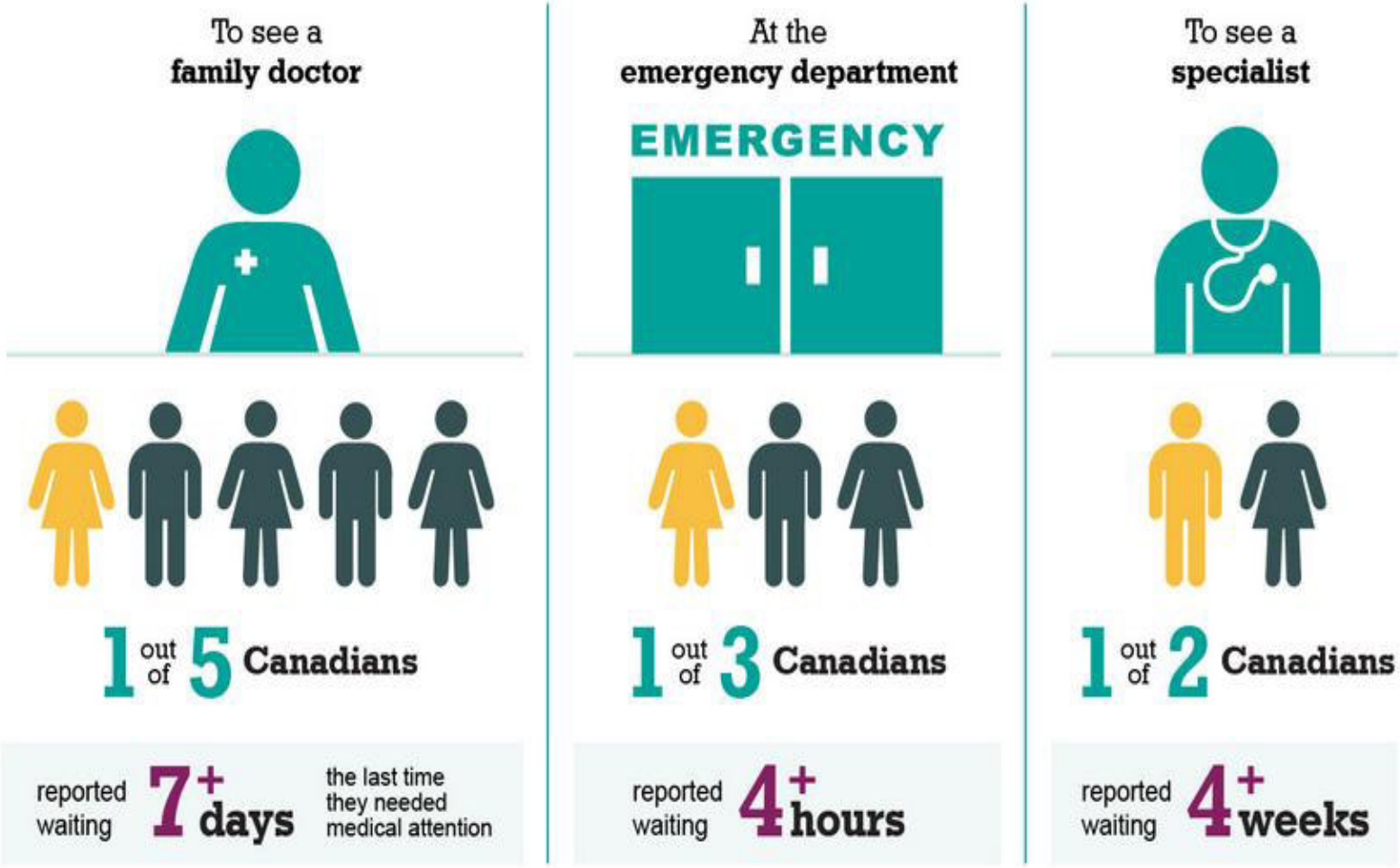
29% of Canadians have a family doctor, but are not able to access them in a timely manner

29% of Family Physicians are planning to retire or changing careers in the next 1–3 years[2]

Picard A. Survey says: Improve access to health care – now. *Globe and Mail.* August 21, 2023. Accessed September 30, 2025. https://www.theglobeandmail.com/opinion/article-survey-says-improve-access-to-health-care-now/

Canadian Institute for Health Information. Commonwealth Fund survey, 2022. Updated June8, 2023. Accessed September 30, 2025. https://www.cihi.ca/en/commonwealth-fund-survey-2022

Canadians Report The Longest Wait Times



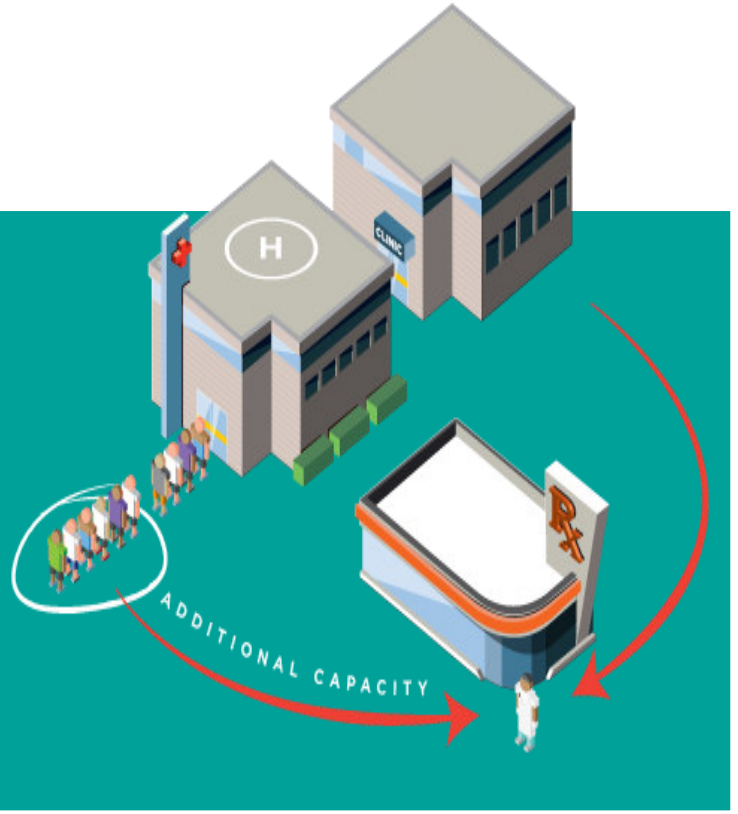
Results From The Commonwealth Fund's 2016 International Health Policy Survey of Adults in 11 Countries

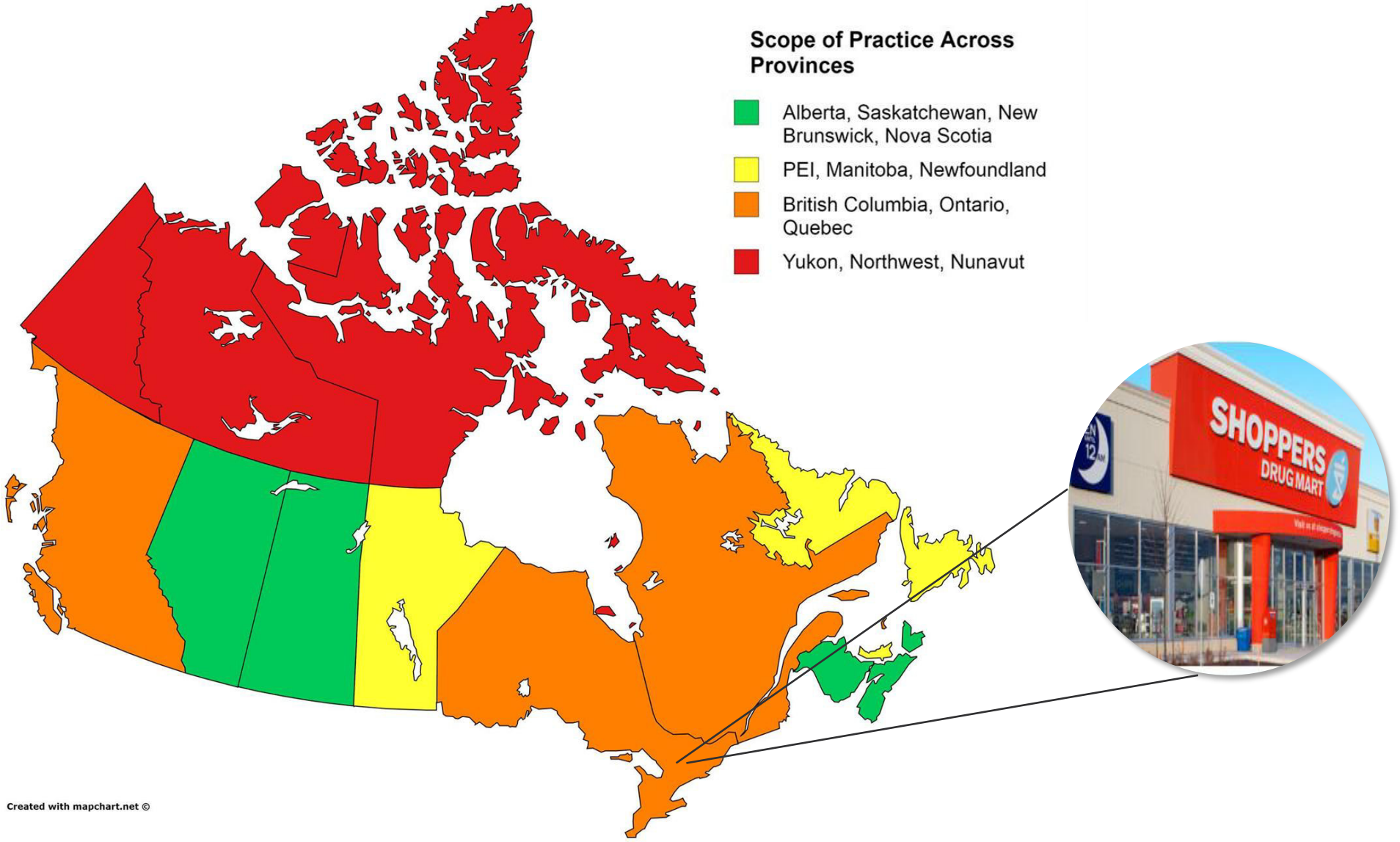
Pharmacists Are Part Of The Solution

REDUCE WAIT TIMES BY SHIFTING UP TO

17 MILLION

PHYSICIAN VISITS TO PHARMACISTS




Scope of Practice Across Provinces
Alberta, Saskatchewan, New Brunswick, Nova Scotia
PEI, Manitoba, Newfoundland
British Columbia, Ontario, Quebec
Yukon, Northwest, Nunavut
SHOPPERS
DRUG MART
Created with mapchart.net ©

PHARMACISTS' SCOPE OF PRACTICE IN CANADA

✓ Implemented in jurisdiction | P Pending legislation, regulation or policy for implementation | X Not implemented

		BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL	YT	NWT	NU
Prescriptive Authority (Schedule 1 Drugs)	Independently, for any Schedule 1 drug	X	✓[4]	X	X	X	X	X	X	X	X	X	X	X
	In a collaborative practice setting/agreement	X	✓[4]	✓[4]	✓[4]	X	✓	✓	✓	X	X	X	X	X
Initiate[1,2]	For minor ailments/conditions	P[6]	✓	✓	✓[4]	✓	✓	✓	✓	✓[4]	✓	✓	X	X
	For smoking/tobacco cessation	X	✓	✓	✓[4]	✓	✓	✓	✓	✓[4]	✓	✓	X	X
	In an emergency	✓[7]	✓	✓[7]	✓[8]	✓	✓	✓	✓	✓	✓[7]	✓[7]	X	X
Adapt/ Manage[1,3]	Make therapeutic substitution	✓	✓	✓[9]	X	X	✓	✓	✓	✓	✓	✓	X	X
	Change drug dosage, formulation, regimen, etc.	✓	✓	✓[9]	✓	✓	✓	✓	✓	✓	✓	✓	X	X
	Renew/extend prescription for continuity of care	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X
Injection Authority (SC or IM)[1,4]	Drugs[5]	✓	✓	✓	✓	X[10]	✓	✓	✓	✓	✓	✓	X	X
	Vaccines[5]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X
	Influenza vaccine	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X
Labs	Order and interpret lab tests	X	✓	P[11]	✓[12]	X	✓	P	P[11]	✓[13]	X	X	X	X
Techs	Regulated pharmacy technicians	✓	✓	✓	✓[14]	✓	X	✓	✓	✓	✓	X	X	X

https://www.pharmacists.ca/pharmacy-in-canada/scope-of-practice-canada/ Accessed Jan 24, 2023

Pharmacy's Time Is NOW

HEALTH

Code Blue: A Global News series delving into Canada's health-care crisis

By Teresa Wright · Global News
Posted August 23, 2022 4:00 am · Updated August 31, 2022 1:12 pm

Canada: Why ERs are struggling to stay open nationwide

By Nadine Yousif
BBC News, Toronto
5 days ago

New Brunswick

Pandemic effects on health care the worst yet, say N.B. doctors and nurses

HEALTH | News CTV NEWS Published Aug. 21, 2022 10:49 p.m. EDT

'I thought I might die at home': Canada's health-care system is crumbling, experts say

Fasken

Regulatory Changes Increase Prescribing Authority of Ontario Pharmacists

As of January 1, 2023, pharmacists in Ontario will be authorized to prescribe specified drugs

New Data Suggests a Gap in Access to Care for Ontarians Living with a Chronic Illness

ONTARIO PHARMACISTS ASSOCIATION

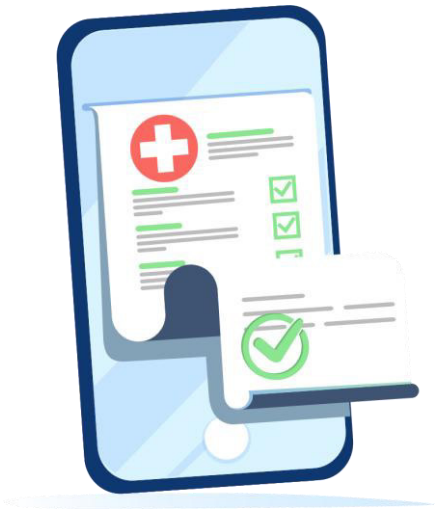
Lethbridge Superstore offers Alberta's first walk-in health clinic led by pharmacists

THE CANADIAN PRESS The Canadian Press

Atlantic Canada's pharmacists want more responsibilities to ease burden on hospitals

STAFF
The Canadian Press
Thursday, April 7th 2022, 8:15 am

THE FUTURE | “YOUR CARE, YOUR WAY”



1

Express
from your pharmacy
health app

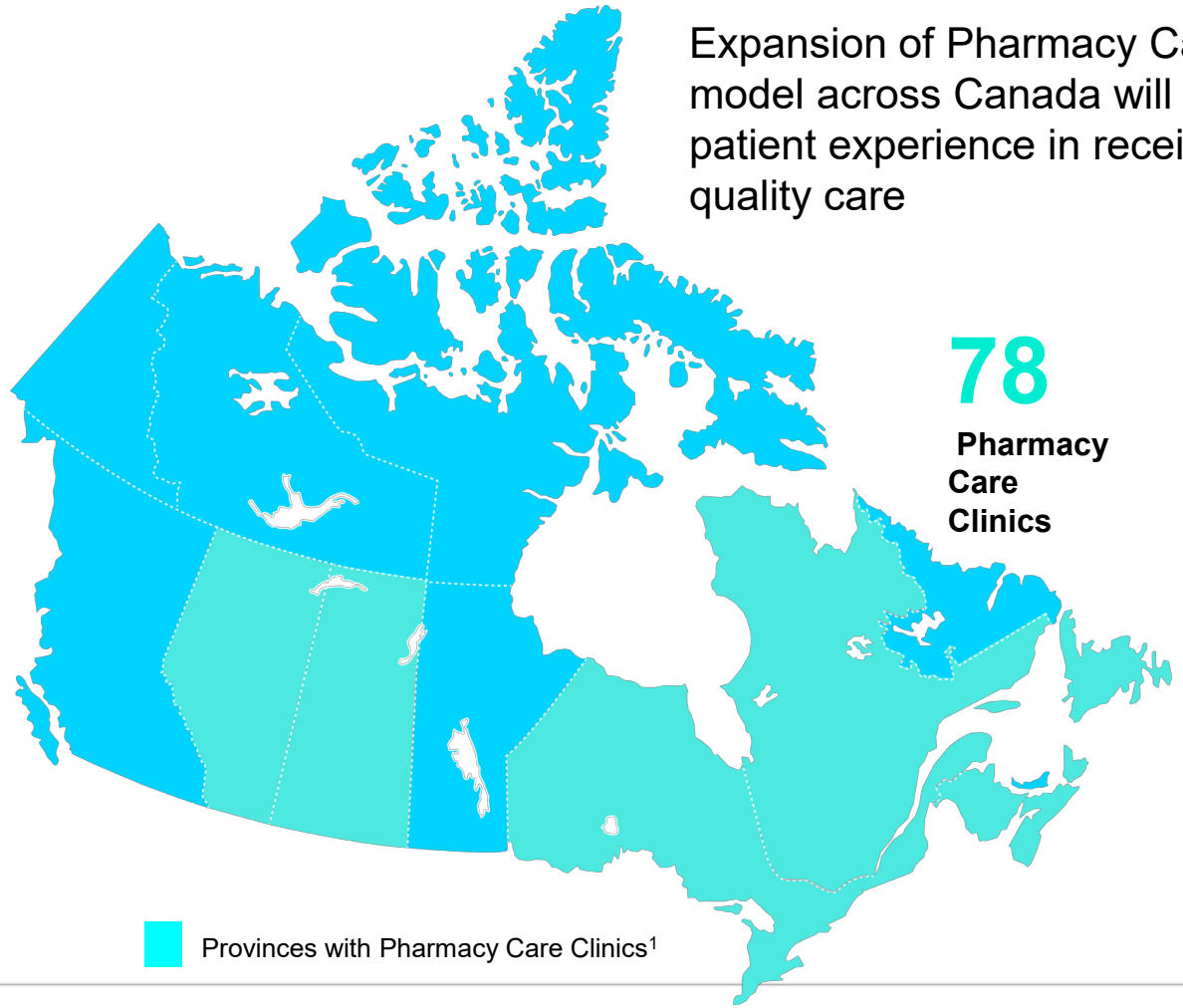
2

Patient Counter
Prescriptions,
at any counter available

3

Clinical Care
Pharmacy Care Concierge
at counter

Pharmacy Care Clinics



Provinces with Pharmacy Care Clinics[1]

Expansion of Pharmacy Care Clinic model across Canada will improve patient experience in receiving quality care

78 **Pharmacy Care Clinics**

152K+ **Patients received care[2]**

228K+ **Services delivered[2]**

35% **Of patients received care for a chronic condition**

Shoppers Drug Mart Corporate Data

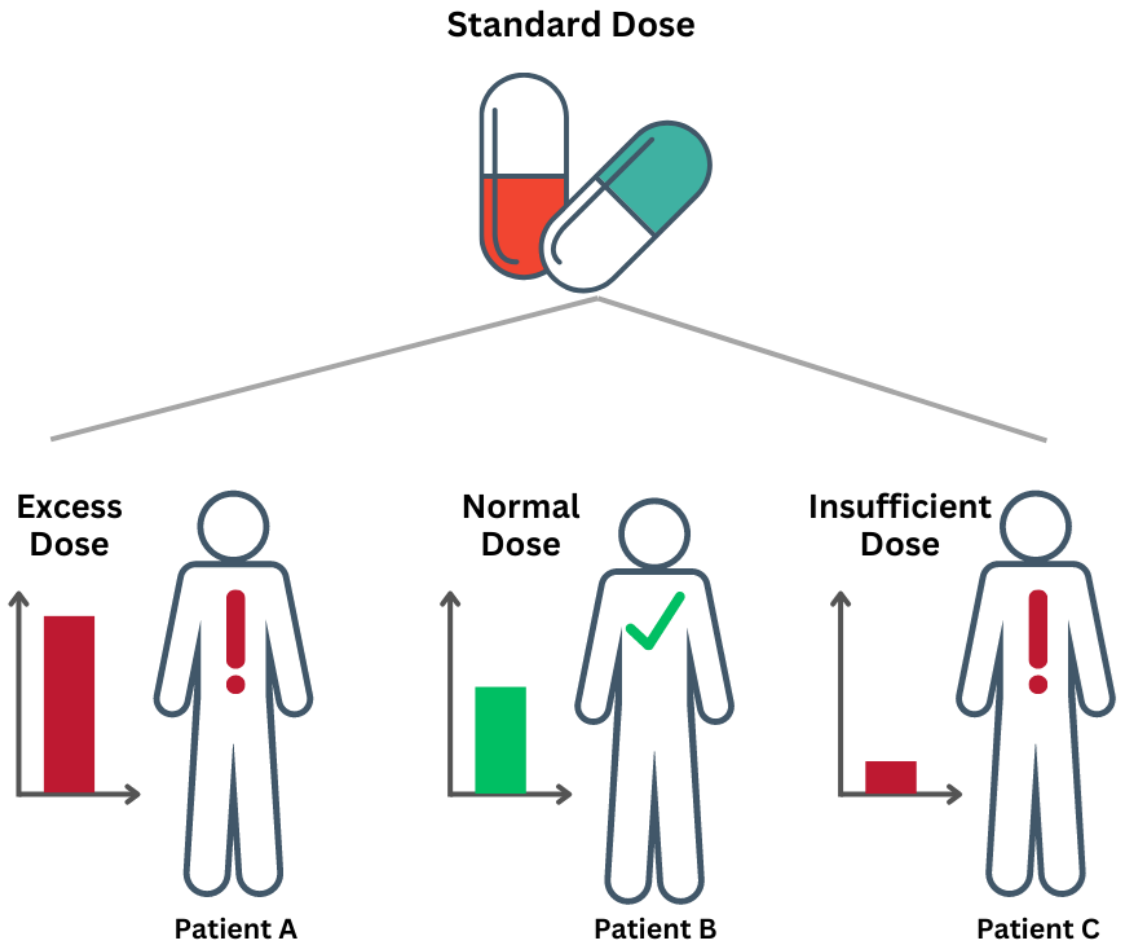
PHARMACOGENOMICS:

TAILORING OF DRUG TREATMENTS TO PEOPLE'S GENETIC MAKEUP,

A FORM OF 'PERSONALIZED MEDICINE'

Pharmacogenomics

Study of how an individual's genes can affect their response to drugs



ASHP Statement on the Pharmacist's Role in Clinical Pharmacogenomics

Position

The American Society of Health-System Pharmacists (ASHP) believes that pharmacogenomic testing can improve medication-related outcomes across the continuum of care in all health-system practice settings. These improvements include reduction in suboptimal clinical outcomes, decreased cost of treatment, better medication adherence, more appropriate selection of therapeutic agents, decreased length of treatment, and enhanced patient safety.[1-3] Because of their distinct knowledge, skills, and abilities, pharmacists are uniquely positioned to lead inter-professional efforts to develop processes for ordering pharmacogenomic tests and for reporting and interpreting test results. They are also uniquely qualified to lead efforts to guide optimal drug selection and drug dosing based on those results. Pharmacists therefore have a fundamental responsibility to ensure that pharmacogenomic testing is performed when needed and that the results are used to optimize medication therapy.[1] Pursuant to this leadership role, pharmacists share account-

The Opportunity

The Problem of Adherence

50%

Rx non-adherence in Canada after 6 months

…Unchanged for 20+ years

1/3

Of medication-related hospital admissions are related to

Poor Rx adherence

THE PROMISE...

Reduces ADRs & associated costs

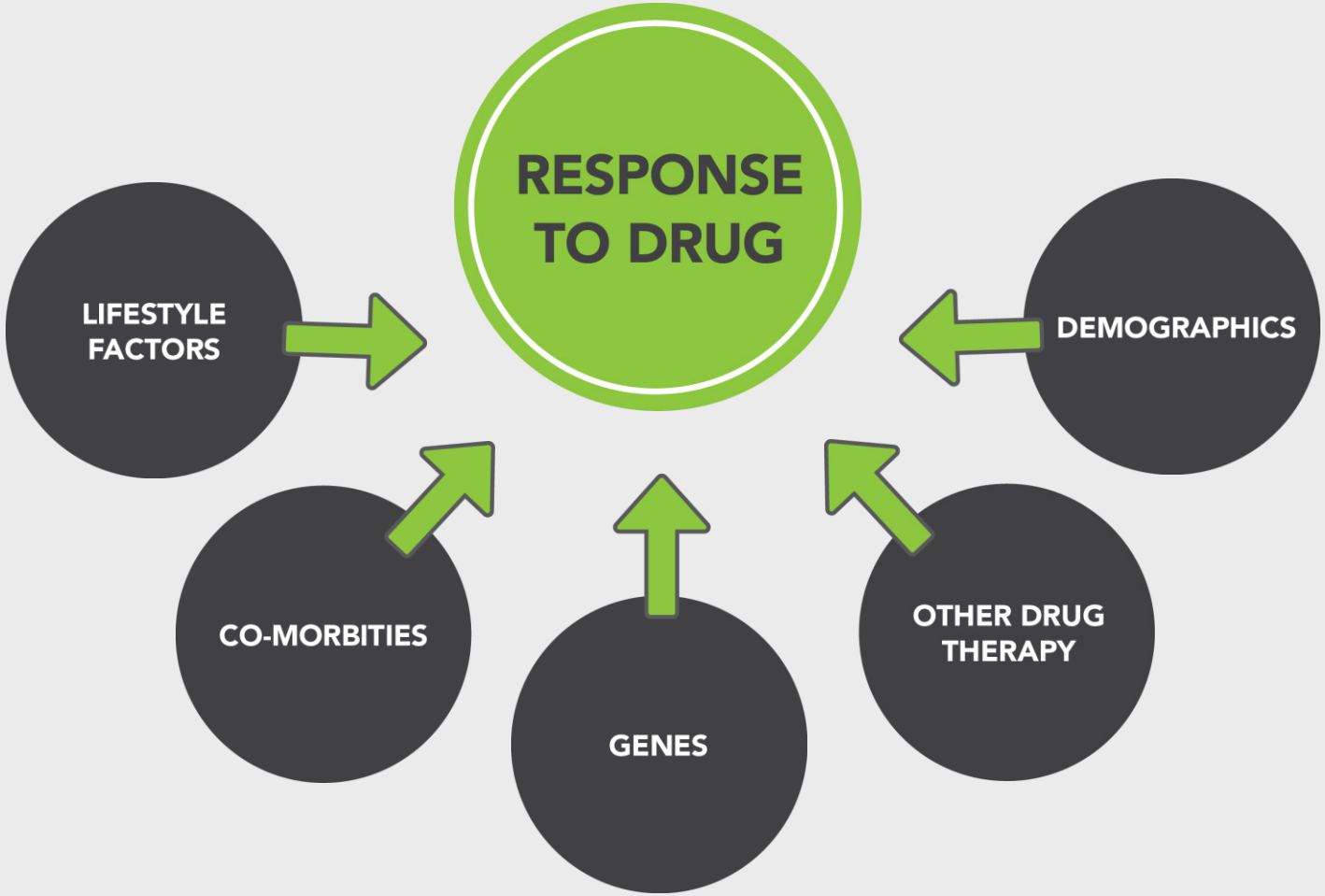
Dosing optimization & better treatment outcomes

Improved adherence & confidence

Reduce total healthcare & medication costs

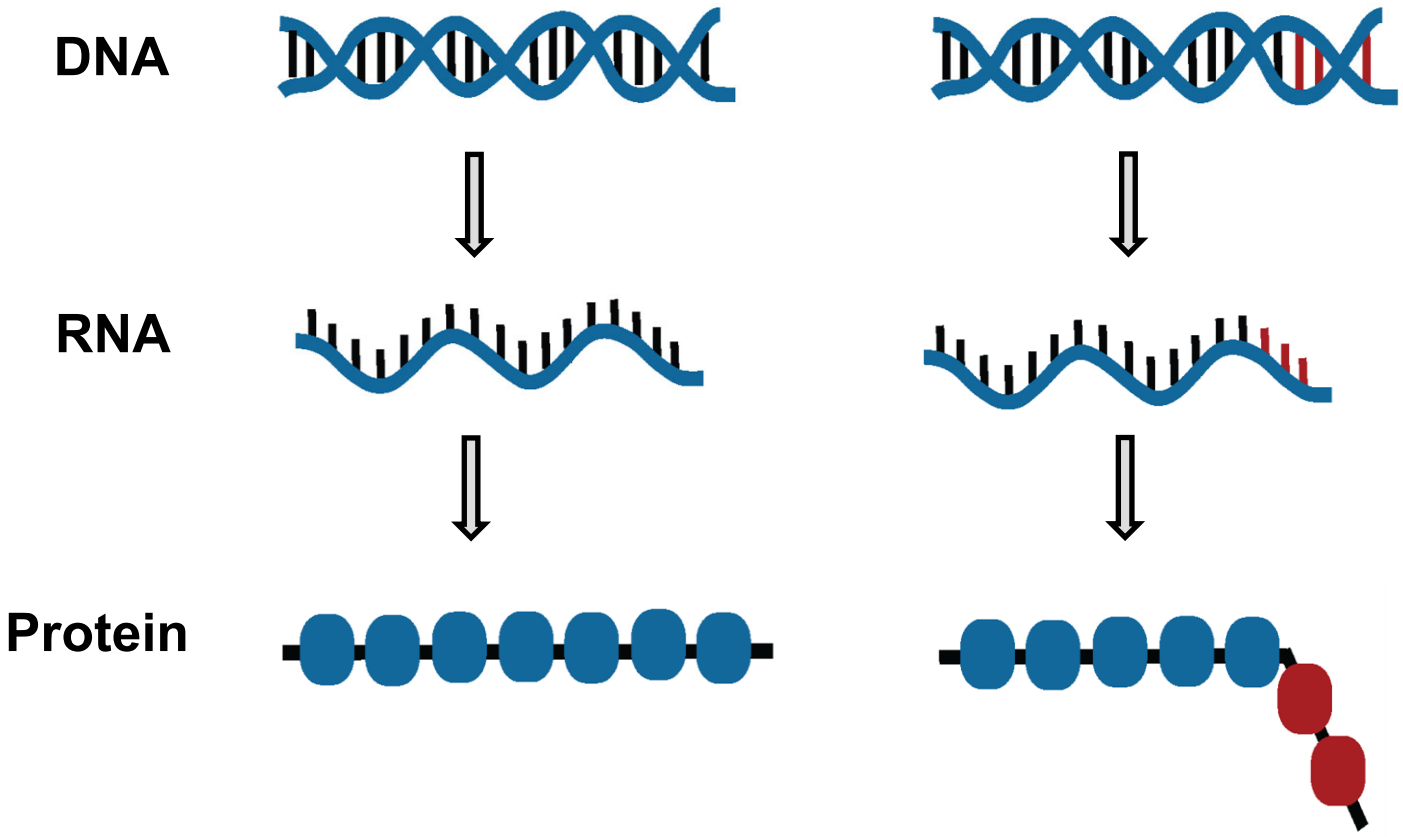
Changing paradigms from reactive to preventative

THE REALITY...


RESPONSE TO DRUG
LIFESTYLE FACTORS
DEMOGRAPHICS
CO-MORBITIES
GENES
OTHER DRUG THERAPY

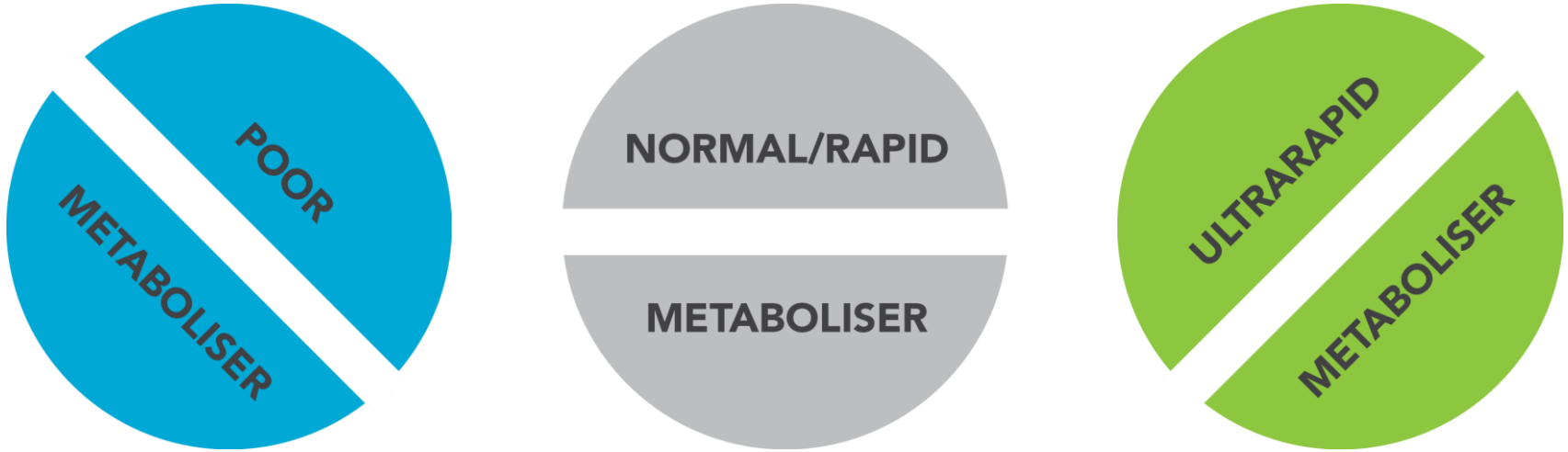
Basic Principles

Variations on DNA Can Alter Function of Enzymes



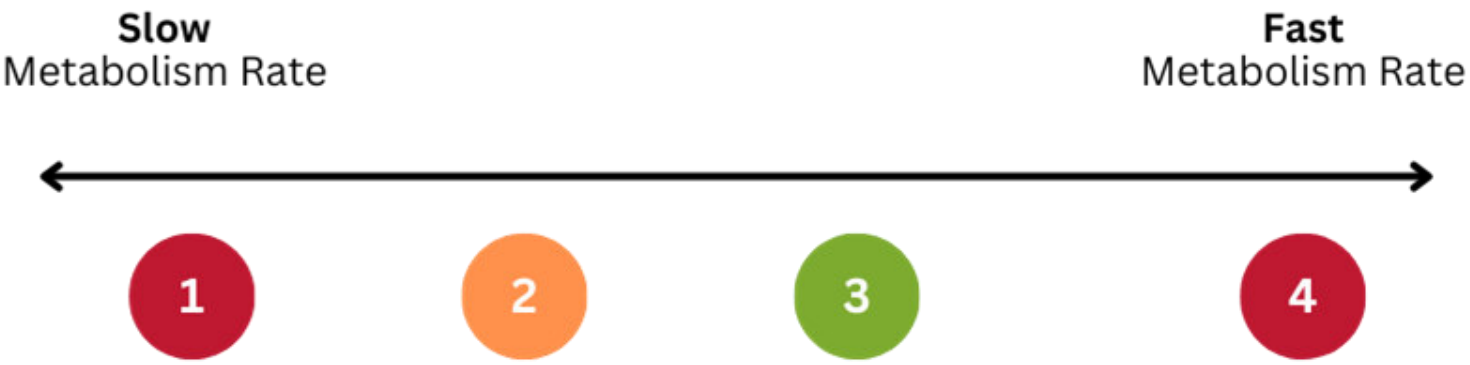
Changes in DNA can alter structure and function of proteins

VARIATIONS IN DRUG METABOLISM



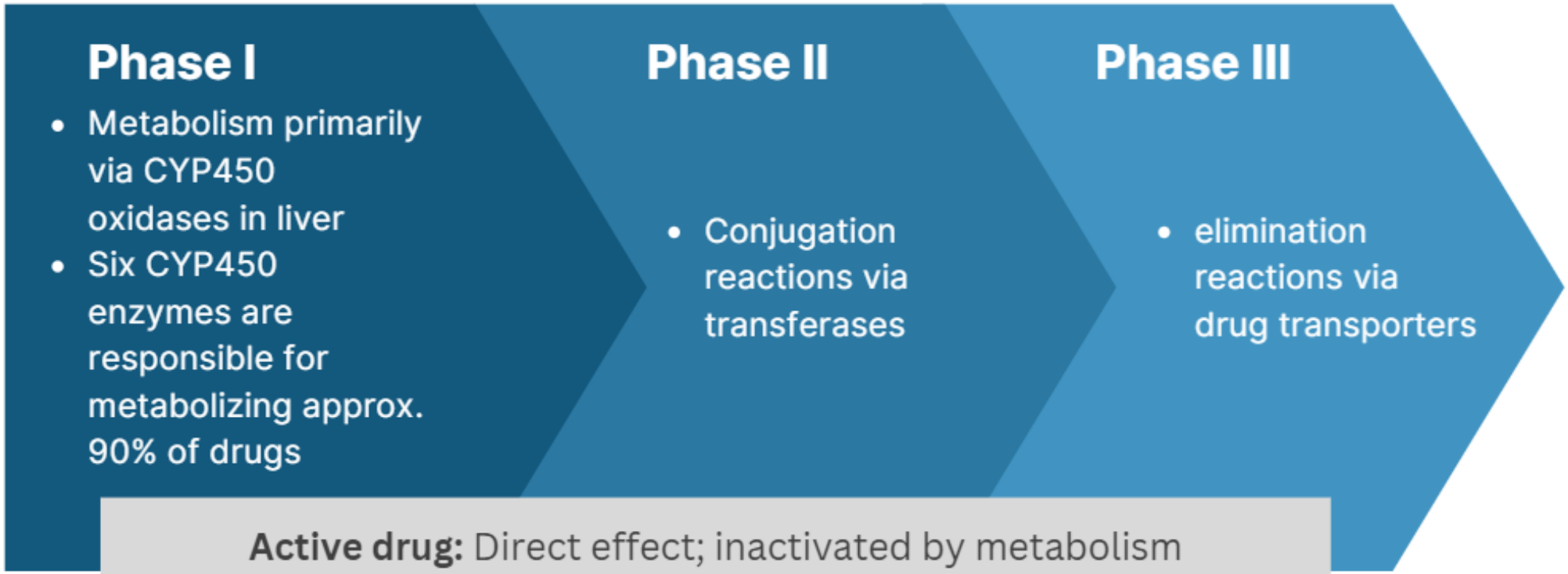
Metabolizer Types – *Phenotypic examples*

Individuals with certain gene alleles can be classified into metabolic categories for each drug:



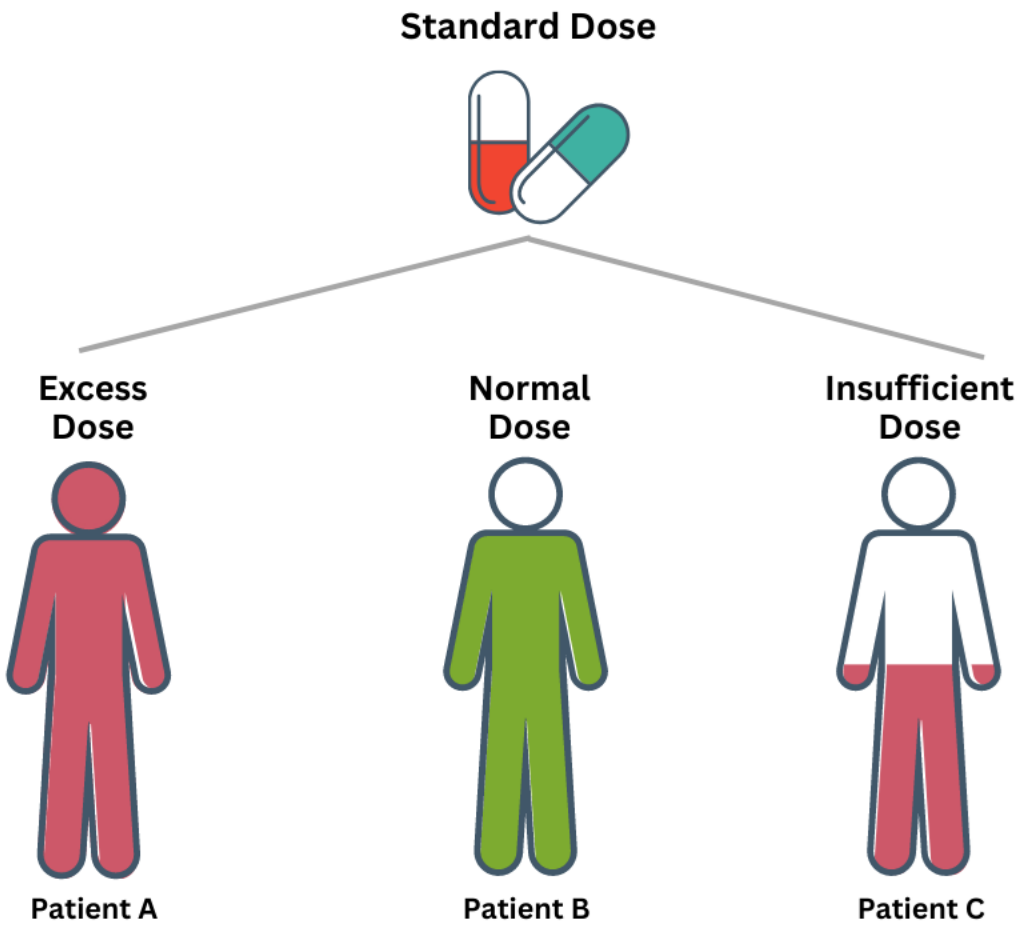
1. Poor Metabolizers
2. Intermediate Metabolizers
3. Normal ("Extensive") Metabolizers
4. Rapid/Ultra-rapid Metabolizers

Drug Metabolism



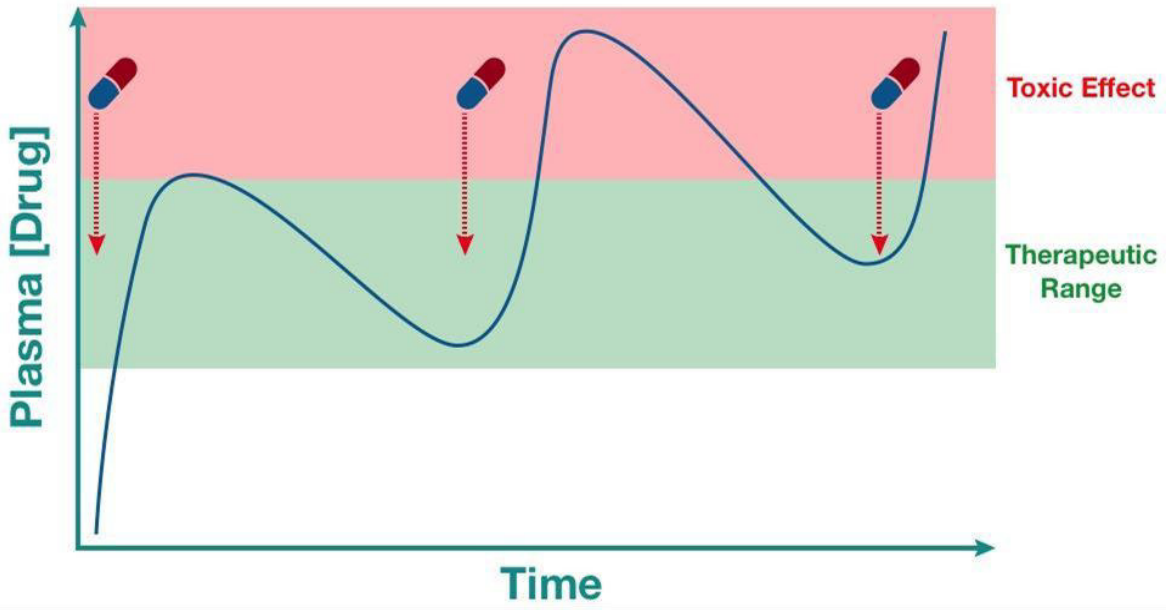
Active drug: Direct effect; inactivated by metabolism
Pro-drug: Must be converted to have clinical effect

Why Do Drugs Affect People Differently?



One person could be clearing the medication very slowly…

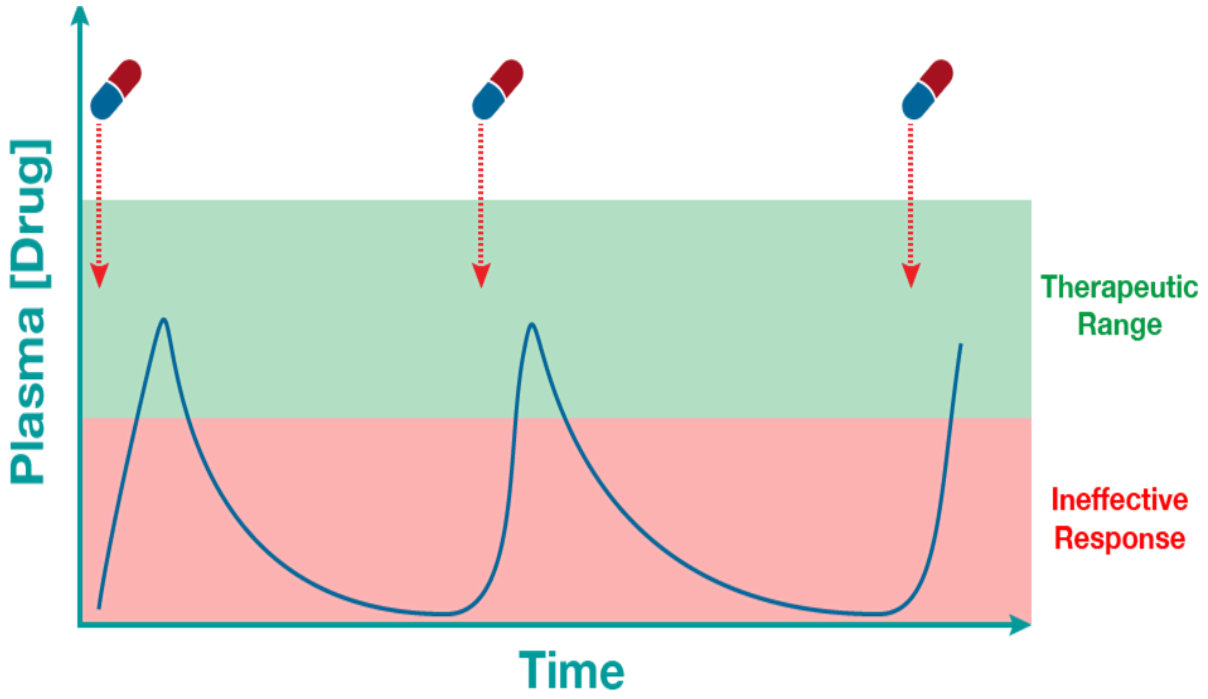
Poor metabolizer



….leading to a build-up of the drug in the plasma, resulting in side effects

...while another could process the same medication too fast

Rapid metabolizer



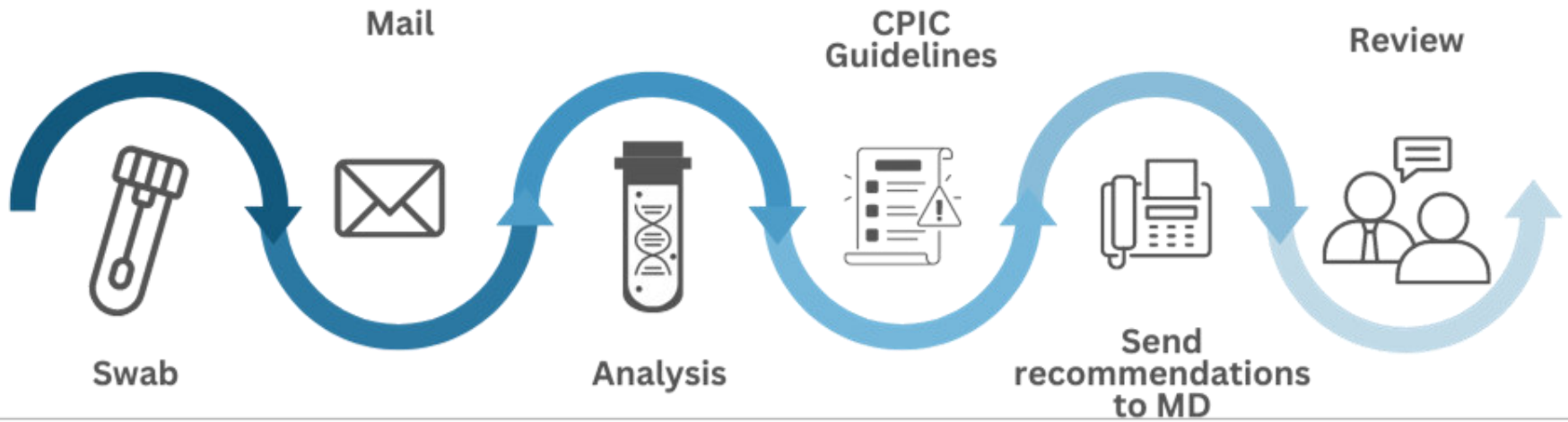
…..and the standard dose is not effective

When drugs are not processed at the expected or ‘normal’ rate, it leads to adverse effects or lack of efficacy.

Principles to Practice

The Process

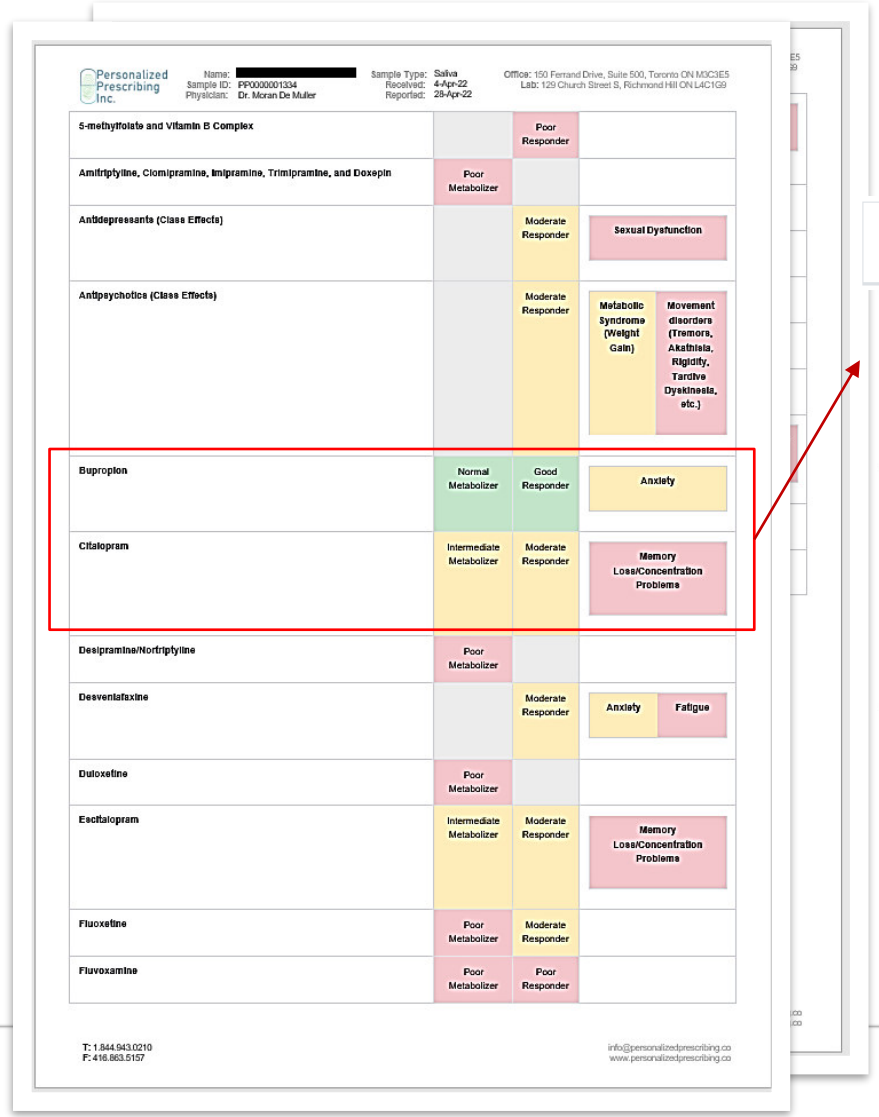

1
2
3
Swab
Mail
Review


Mail
CPIC Guidelines
Review
Swab
Analysis
Send recommendations to MD

Reporting

PGx test reports help translate results from genetic laboratory test into clinically actionable prescribing decisions for affected drugs.

Interpreting The Report


Personalized Prescribing Inc.

Name: [redacted] Sample ID: PP0000001334 Physician: Dr. Moran De Muller

Sample Type: Saliva Received: 4-Apr-22 Reported: 28-Apr-22

Office: 150 Ferrand Drive, Suite 500, Toronto ON M3C3E5 Lab: 129 Church Street S, Richmond Hill ON L4C1G9

5-methylfolate and Vitamin B Complex		Poor Responder	
Amitriptyline, Clomipramine, Imipramine, Trimipramine, and Doxepin	Poor Metabolizer		
Antidepressants (Class Effects)		Moderate Responder	Sexual Dysfunction
Antipsychotics (Class Effects)		Moderate Responder	Metabolic Syndrome (Weight Gain); Movement disorders (Tremors, Akathisia, Rigidity, Tardive Dyskinesia, etc.)
Bupropion	Normal Metabolizer	Good Responder	Anxiety
Citalopram	Intermediate Metabolizer	Moderate Responder	Memory Loss/Concentration Problems
Desipramine/Nortriptyline	Poor Metabolizer		
Desvenlafaxine		Moderate Responder	Anxiety; Fatigue
Duloxetine	Poor Metabolizer		
Escitalopram	Intermediate Metabolizer	Moderate Responder	Memory Loss/Concentration Problems
Fluoxetine	Poor Metabolizer	Moderate Responder	
Fluvoxamine	Poor Metabolizer	Poor Responder	

T: 1.844.943.0210
F: 416.863.5157

info@personalizedprescribing.co
www.personalizedprescribing.co

Summary of the results obtained from the test.

Drug	Metabolism	Efficacy	Side Effects
Bupropion	Normal Metabolizer	Good Responder	Anxiety
Citalopram	Intermediate Metabolizer	Moderate Responder	Memory Loss/Concentration Problems

Good responder (green)
Proceed

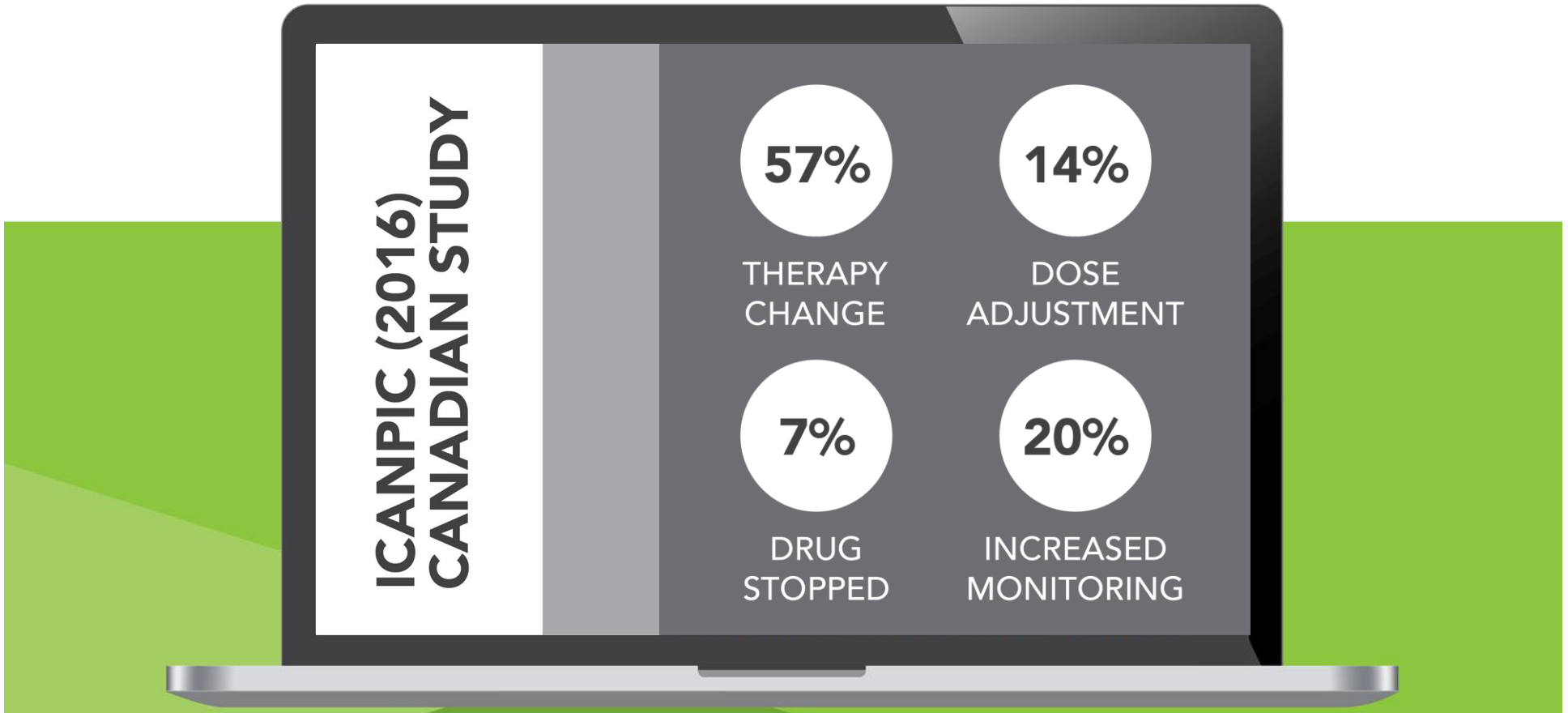
Moderate responder (yellow)
Use with caution if cannot find a good response medication

Poor responder (red)
Avoid

Overall recommendation for treatment

Practice Research

EMERGING RESEARCH



THE INSIDE STORY®

WE RECOGNIZE THE POTENTIAL VALUE

SCIENTIFIC EVIDENCE ISN'T CLEAR YET

FURTHER EVIDENCE IS NEEDED

KEY UNANSWERED QUESTION

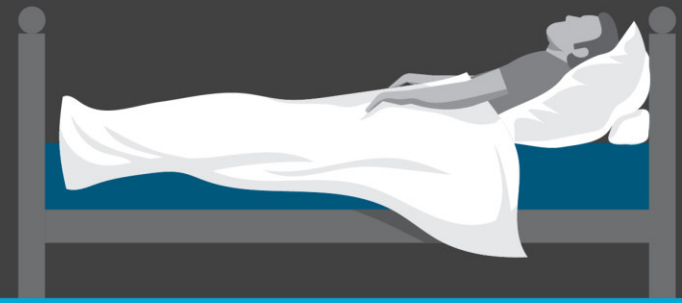
Does clinician access to pharmacogenetic test results during routine clinical care **improve patient outcomes** relative to care provided in absence of that information?

CASE STUDY:

DEPRESSION

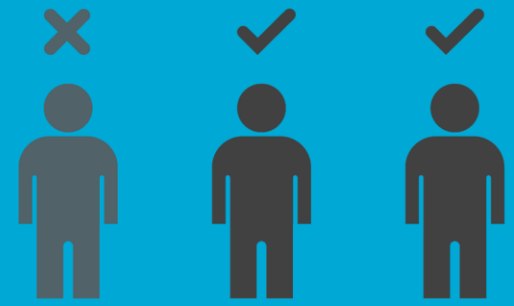
IMPACTS MANY PLAN MEMBERS

LEADING CAUSE OF DISABILITY



LOW ADHERENCE

1/3 DO NOT RESPOND TO TREATMENT



CONTROL GROUP

- Standard care
- Clinical services, including medication review
- Cheek swab testing

- Drug therapy optimization based on clinical judgement

INTERVENTION GROUP

- Standard care
- Clinical services, including medication review
- Cheek swab testing

- Drug therapy optimization based on pharmacogenomic test results

PROJECT DESIGN

FOCUS ON MENTAL HEALTH

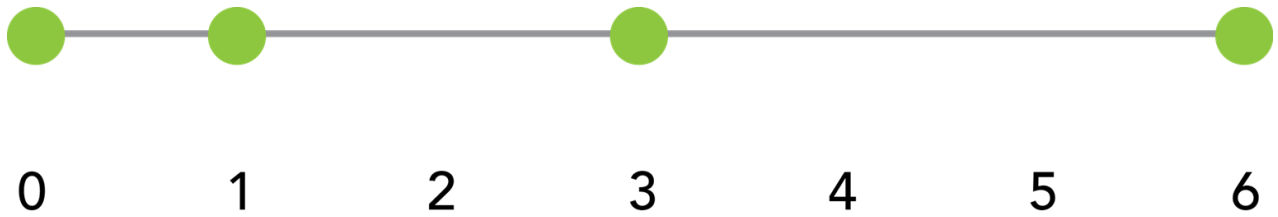
200 PATIENTS RECRUITED

PHARMACISTS BLINDED

PATIENTS BLINDED

SIX MONTHS IN DURATION

OUTCOME-BASED MEASURES



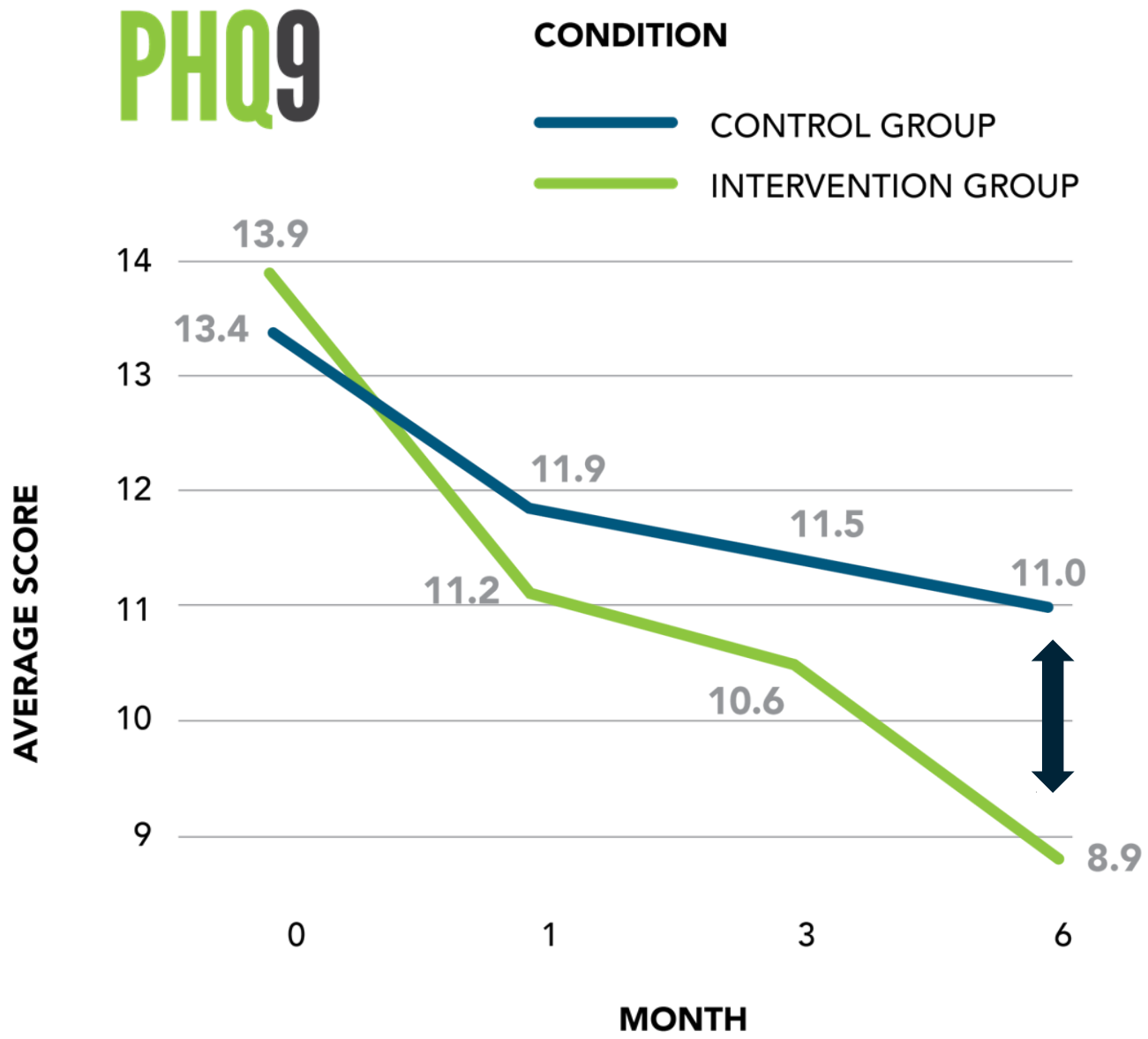
MONTHS

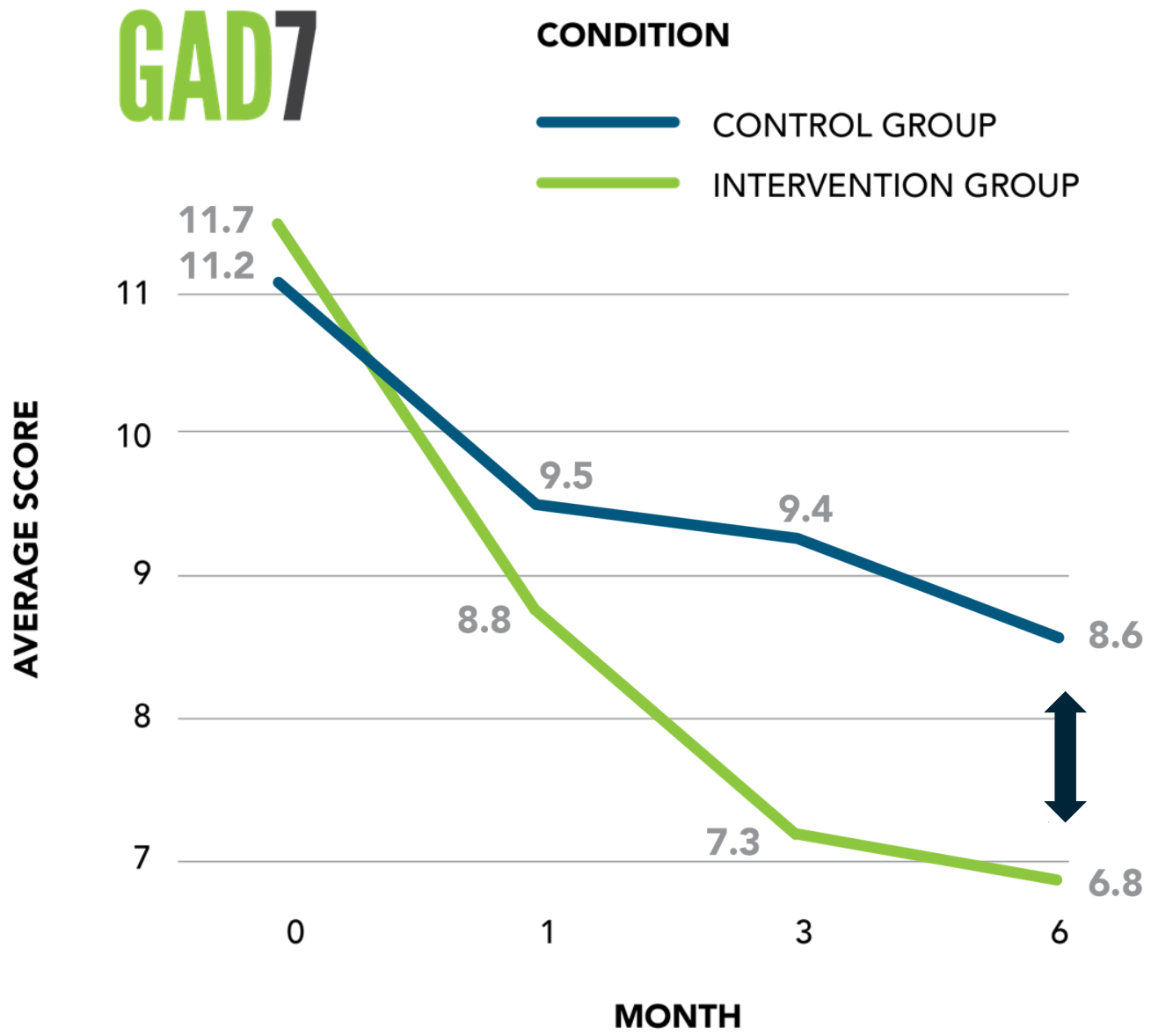
Patients fill out the following questionnaires:

- SATMED-Q
- PHQ-9
- GAD7
- SDS Scale

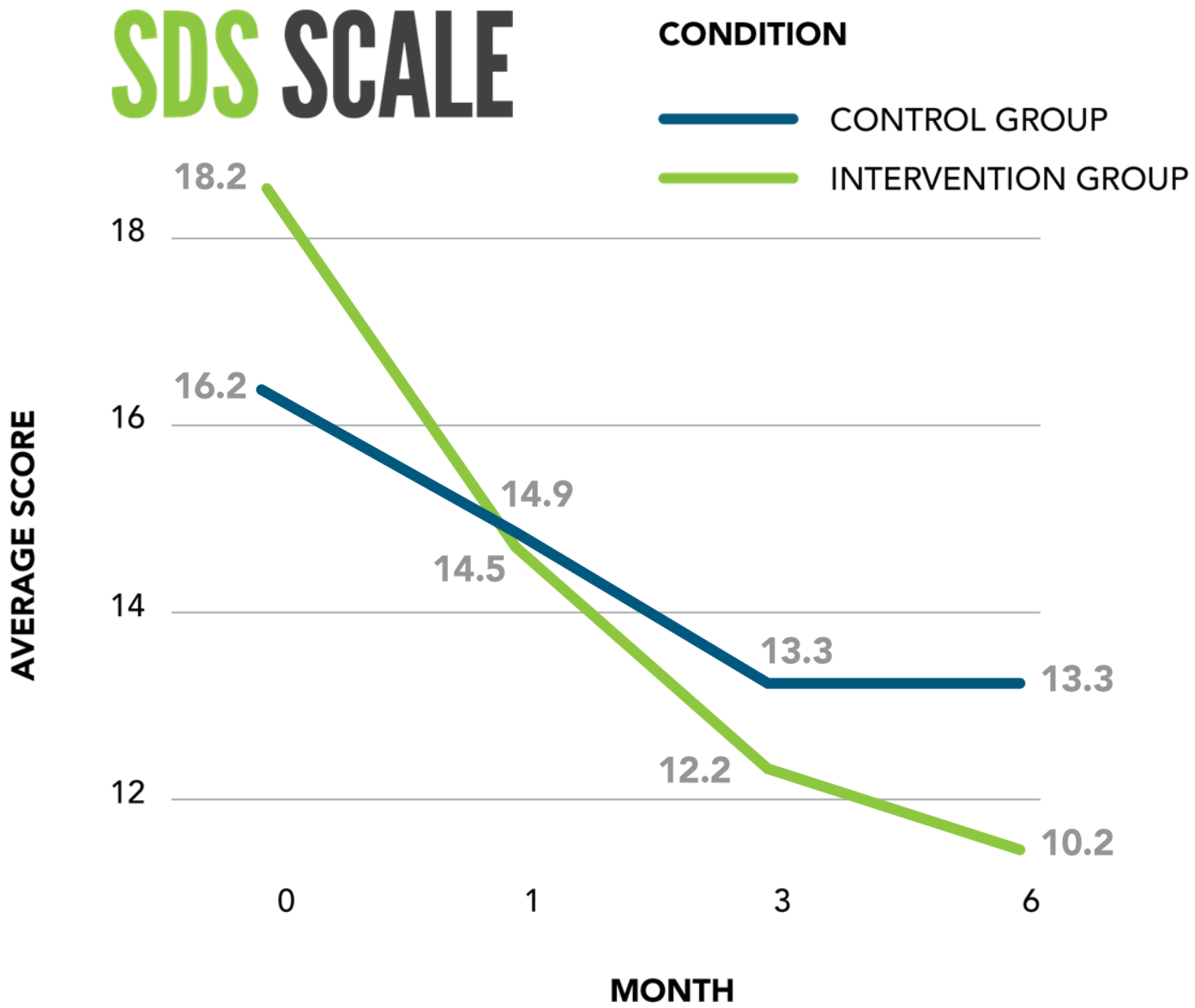
RESULTS

	Control	Treatment
Number of patients	108	105
Gender	Female 76% Male 24%	Females 73% Male 27%
Average Age	43.5	41.9
Average Baseline PHQ-9	13.4 (moderate)	14.0 (moderate)
Average Baseline GAD-7	11.2 (moderate)	11.8 (moderate)
Average Baseline SDS	16.3	18.3


PHQ9
CONDITION
CONTROL GROUP
INTERVENTION GROUP
13.9
13.4
11.9
11.5
11.0
11.2
10.6
8.9
14
13
12
11
10
9
AVERAGE SCORE
0
1
3
6
MONTH


GAD7
CONDITION
CONTROL GROUP
INTERVENTION GROUP
AVERAGE SCORE
11.7
11.2
11
10
9.5
9.4
9
8.8
8.6
8
7.3
6.8
7
0
1
3
6
MONTH

SDS SCALE


CONDITION
CONTROL GROUP
INTERVENTION GROUP
18.2
16.2
14.9
14.5
13.3
13.3
12.2
10.2
18
16
14
12
0
1
3
6
AVERAGE SCORE
MONTH

Challenges

Common Barriers to Implementation

Lack of time and resources

Lack of pharmacist confidence or knowledge

Patient hesitancy

Lack of patient awareness or interest

PGx Controversies

1. It's not just the test – it's the interpretation of the results

1. Are pharmacies promising more than they can deliver?

1. A business case to sell testing is not the same as a medical reason to offer testing

1. Does genomic testing represent good value for the cost?

1. Not yet a revolution in medicine

Conclusions

1. Pharmacists are ideally suited to offer pharmacogenomic screening

1. Comprehensive training is essential

1. Early experience is promising

1. Anectodal feedback from patients is positive

1. Interprofessional collaboration is instrumental for clinics to be successful

Thank You

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@Papasterg

soundcloud.com/the-pharmacists-are-in/

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A podcast by pharmacists, for pharmacists

Canadian Pharmacists Association
Association des pharmaciens du Canada