

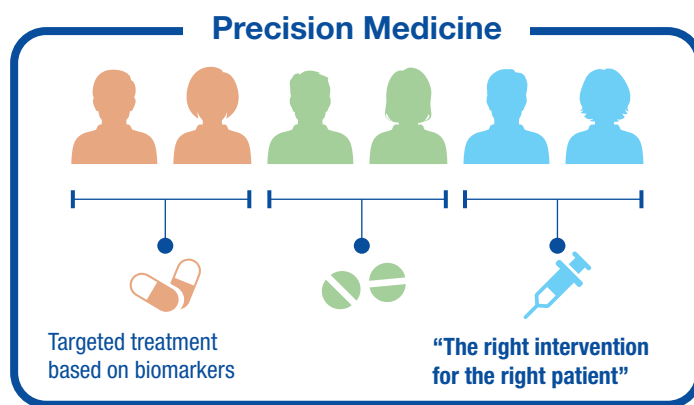
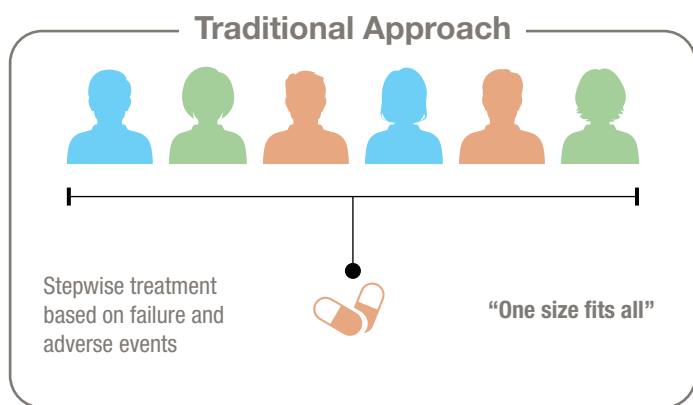


PRECISION MEDICINE

Tailors the surveillance, monitoring, or interventional management of an individual patient's disease¹

In **Precision Medicine (PM)**, biomarkers identify an individual's risk of disease development and prognosis, probable response to a particular intervention, and can be used to monitor clinical response or toxicity to therapy.¹

PM also improves the ability to prevent disease, promote health, and reduce health disparities in populations by (1) applying emerging methods and technologies for measuring disease, pathogens, exposures, behaviours, and susceptibility in populations; and (2) developing policies and targeted implementation programs to improve health.²



Precision Medicine delivers on the *Quadruple Aim*



Improve patient outcomes

Technological advancements will reduce costs and turnaround times. Next generation sequencing will likely become an up-front investigation for more personalized therapy.³

Multiplex genetic testing for BRAF, KRAS, and NRAS mutations in metastatic colorectal cancer can guide therapy based on specific mutations for better outcomes.⁴



Improve health of general population

PM aims not to extend life expectancy (although this is likely), but to improve long-term wellness. Reducing disease severity considerably or delaying disease onset – perhaps almost totally – are the major benefits to be gained.⁵



Improve healthcare sustainability

PM can reduce health costs by optimizing therapy and improving patient outcomes by lowering costs associated with sub-optimal treatment.¹

Combining evidence-based medicine and precision medicine approaches will optimize medical practice.⁵



Improve care team well-being

Health care team well-being is linked to patient experiences.⁶

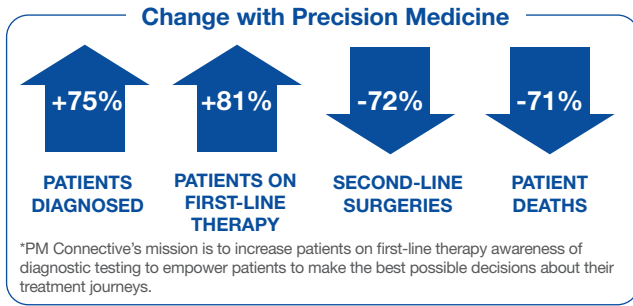
PM can give clinicians confidence to efficiently select the best therapies efficiently, with continual refinement in the approach to prescribing.¹

The Value of Precision Medicine: Illustrative Examples

Metastatic Melanoma

Metastatic melanoma is a fatal disease with a rapid systemic dissemination. Survival is typically <1 year.⁷

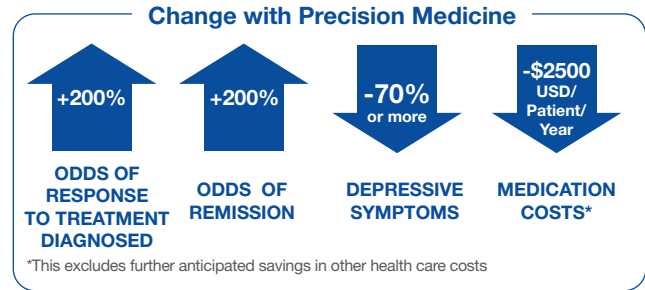
PM can increase the number of patients diagnosed with melanoma and provided with first-line therapy while reducing second-line surgeries and increasing survival. PM Connective (pmconnective.org) developed a model that estimated the benefits of PM in diagnosing and treating melanoma.^{8*}



Major Depressive Disorder (MDD)

The 2010 US economic burden of MDD was estimated at \$210.5 B.⁹ The prevalence of MDD in Canada is 8.2% (about 3 million people).¹⁰

PM can identify the neuropsychiatric medications likely to work best in a patient with MDD.^{11,12,13,14,15}



In 1,871 Canadian patients with MDD, response rate improved by 31% in patients taking genetically congruent (little/no gene-drug interactions) vs. incongruent medications.¹⁰

As of 2016, there were 132 precision medicine drugs and relevant biomarkers to drive therapy in the United States. (Precision Medicine Report 2017)

Therapeutic Area	Intervention	Delivery on Quadruple Aim			
		Improved Patient Outcomes	Improved Health of General Population	Improved Healthcare Sustainability	Improved Care Team Well-being
Cardiovascular	Hyperlipidemia	<25% of patients have statin-related muscle spasms ¹⁶	Select intervention based on genetic profile ²¹	Significantly reduces statin-induced myopathies and improves guided treatment ²¹	All PM approaches improve satisfaction and confidence among healthcare providers; their well-being is linked to the experience of patients.⁶
Cancer	Ovarian cancer	20-30% of high-grade cases have the BRCA mutation which informs treatment plan ¹⁷	Optimal therapy (olaparib) increases PFS by 13.6 months and reduces risk of death by 20% ¹⁷	\$7500/28-day course of therapy spent only on those with BRCA mutation ¹⁷	
Antimicrobial	Respiratory infection diseases (e.g. COVID-19 or Influenza)	Reduce time in isolation by four days ¹⁸ Use of multiplex PCR for respiratory pathogens in children decreases antibiotics use and chest X-rays ¹⁹	Select best intervention based on a quick detection of pathogens (bacteria, viruses, yeast) ¹⁸ Reduce unnecessary use of antibiotics ¹⁹	Reduce infection control isolation by four days ¹⁸ Decrease healthcare resource utilization ¹⁹	
Inflammation	Inflammatory bowel disease	IBD risk may be >3 times higher in 3.2% of the population. ²⁰	Those with increased risk may help in clinical trials for preventative drug development ²⁰	Treating patients who benefit from targeted therapies will improve outcomes and sustainability.	

IBD = inflammatory bowel disease; PCR = polymerase chain reaction; PFS = progression-free survival

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