PROPHET TOOLBOX FACTSHEET#6

JULY 2026

The Pharmacogenetic Passport

PROPHET
a PeRsOnalized Prevention roadmap for the future HEalThcare

What is Pharmacogenomics?

Pharmacogenomics (PGx) is the study of how inherited genetic variation influences individual responses to medications, affecting both drug efficacy and the risk of adverse drug reactions (ADRs). ADRs account for an estimated 5-15% of adult hospital admissions in Europe. Around 90-95% of the general population carries at least one high-risk actionable pharmacogenetic variant, and approximately 25% of people who use medications could benefit from a pharmacogenetic profile. By identifying patients at increased risk of ADRs or reduced drug efficacy, PGx enables clinicians to prescribe personalized drugs or dosages, maximizing therapeutic benefit and minimizing harm.

PGx testing can be conducted at different time points:

Reactive testing: performed after an ADR or when drug efficacy is lacking;

Pre-therapeutic testing: conducted before prescribing a specific medicine;

Pre-emptive testing: performed without immediate clinical indication, before any target drug is prescribed.

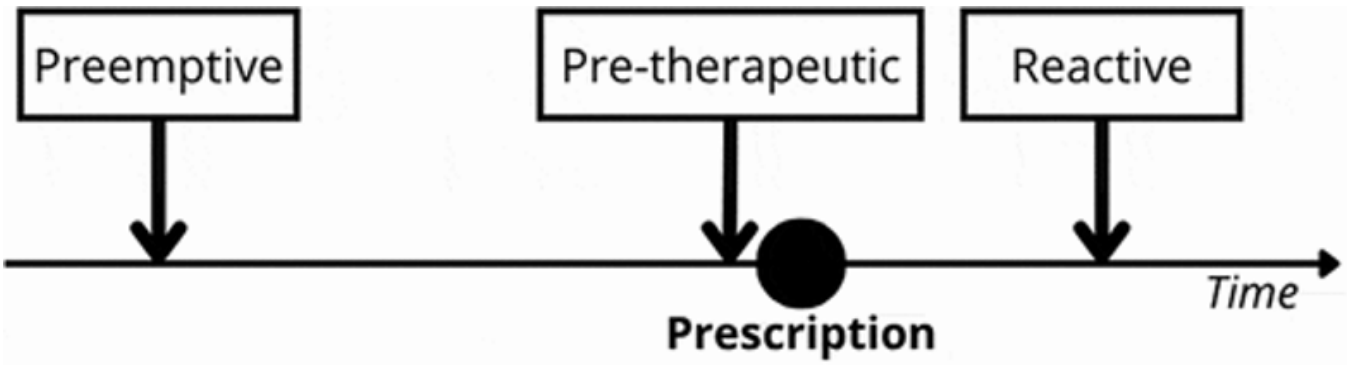

Fig 1. Difference between preemptive testing, pre-therapeutic testing and reactive PGx testing in time related to moment of drug prescription. Figure based on Rigter et al., Front Genet., 2020.

The Pharmacogenetic Passport

A **Pharmacogenetic Passport** is a pre-emptive, multi-gene testing format that provides patients and healthcare professionals with actionable information that can be used throughout a patient's lifetime.

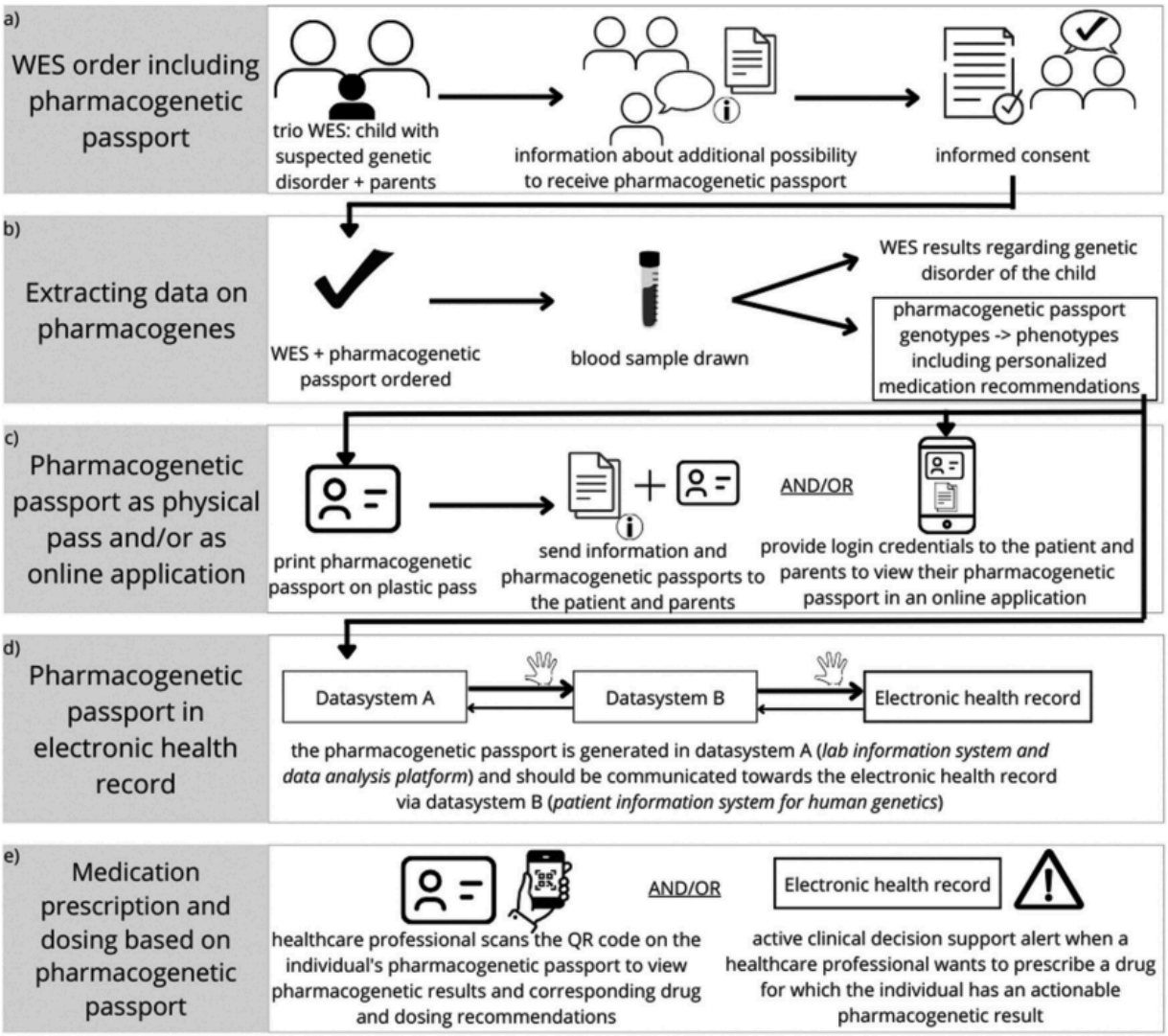

Fig 2. Workflow (a-e) regarding a pharmacogenetic passport in practice, reusing WES data of trios (patient and both biological parents). Figure modified by Roelofsen et al., Pharmacogenomics, 2025.

Where integration into electronic health records (EHRs) is not yet technically feasible, results and tailored prescribing recommendations can be delivered via a physical card (with a QR code) or a secure digital application.

In this approach, patients remain in control of sharing their pharmacogenetic information with healthcare professionals, who can access relevant results and recommendations at the point of prescribing. One practical example is the **"myDNAmedicationpass"** piloted at Amsterdam UMC, Leiden UMC and across medical centers in the Netherlands. This tool was generated by reusing whole exome sequencing (WES) data from patients undergoing genetic diagnostics, making it an efficient, low-cost approach to pre-emptive testing.

Key areas for European Policy

A European multidisciplinary expert workshop, held in Amsterdam in January 2025, brought together 55 participants from 10 European countries. Based on expert presentations and discussions structured around three pillars (evidence, acceptance, and integration), five key priorities were identified for advancing PGx across European healthcare systems.

1. **Robust clinical and health economic evidence:** generate policy-relevant evidence on clinical utility and cost-effectiveness of multi-gene PGx panels, including data from diverse populations and long-term outcomes, to support funding and reimbursement decisions.

2. **Education, training and public awareness:** train healthcare professionals to apply and interpret PGx tests; increase public awareness via campaigns, multiple communication channels and digital tools; engage patient organizations and policymakers to build trust and demonstrate value.

3. **IT infrastructure and interoperability:** build interoperable digital infrastructure to integrate PGx data into EHRs and clinical decision support systems; standardize data formats and ensure that results are accessible at the point of care across the healthcare chain.

4 **Harmonized regulatory and reimbursement policies:** define clear reimbursement models, align EU and national policies, and develop national PGx implementation roadmaps; include PGx counselling in reimbursement frameworks.

5 **Equitable access:** reduce financial and geographic barriers to PGx testing; standardize indicators to monitor equitable uptake; invest in laboratory infrastructure in underserved regions and expand research on underrepresented populations.

From evidence to practice: a policy call to action

Pre-emptive pharmacogenetic testing holds substantial potential to improve patient outcomes, enhance medication safety, and support healthcare sustainability. Although the evidence base is still evolving, current data already support the clinical utility and economic value of targeted PGx testing for several gene-drug pairs. Real-world studies, such as the PREPARE trial, show meaningful reductions in ADRs when PGx-guided prescribing is implemented.

Improve medication safety: pre-emptive genetic profiling can reduce preventable ADRs.

Support healthcare sustainability: cost-effective PGx testing can reduce hospitalization costs.

Enable European coordination: shared policies and interoperable data systems are key to scale.

The European Health Data Space offers a timely opportunity to embed PGx within a secure, interoperable digital infrastructure, advancing its role as a standard component of personalized medicine.

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