EE561

Evaluating the cost-effectiveness of pharmacogenetic testing via the Mantara® PGx DNA Test : insights from NHS health check integration and UK-based economic modelling

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Background

Of 90% of prescription drugs, only 30-50% are effective and are either ineffective or can cause adverse drug reactions (ADRs)[1,2]

The PREPARE study found that pharmacogenetics-guided (PGx) prescribing would be estimated to contribute to a 30% reduction in clinically relevant ADRs[2]

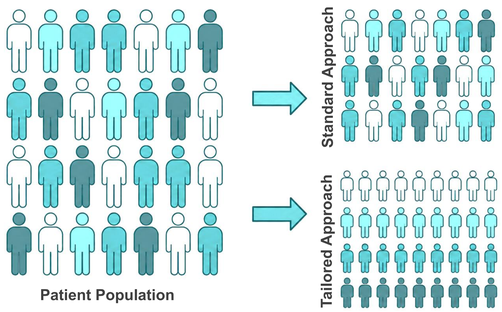
The Mantara® PGx DNA Test is a simple saliva or blood test that helps identify patients earlier and match them to the most effective treatments

The UK Government has outlined plans to integrate PGx testing into the NHS over-40s Health Check[3]

Objectives

To produce an early model to provide initial estimates of the cost-effectiveness of a PGx Testing as part of the NHS over-40s Health Check

Figure 1. Precision Medicine and the 3R's



Methods

Literature review
- A targeted literature review identified UK-based cost-effectiveness evidence for pharmacogenetic testing relevant to the genes and drug–gene pairs included in the PGx Test
- Studies were included if they reported both costs and quality-adjusted life years (QALYs)

Model overview
- A cost-utility model was developed to estimate the value for money of offering the PGx Test alongside the NHS Health Check compared with usual care
- The model incorporated test costs, disease incidence, prescribing patterns, allele frequencies, adverse drug reaction costs, quality-of-life impacts, and costs and outcomes associated with alternative treatment pathways

Base case assumptions
- The PGx Test was assumed to be offered as an additional component of the NHS Health Check for adults aged 40-74 years
- NHS Health Check costs were excluded from the incremental analysis because they applied to both the intervention and comparator arms
- The model assumed that all patients diagnosed with a relevant condition would be offered pharmacotherapy, and that actionable PGx results would inform prescribing decisions

Scenario analyses
- Scenario analyses explored uncertainty and alternative implementation settings
- These included *CYP2C19* testing for people with depression treated with selective serotonin reuptake inhibitors, testing in people newly prescribed atorvastatin, single-gene testing for statin prescribing, and alternative evidence sources for warfarin-related pharmacogenetic testing

Results

Literature review findings
- Only four published studies reported cost-effectiveness evidence for three treatments which covered the genotyping of four of the genes in the Mantara® PGx DNA Test (*CYP2D6*, *CYP2C9*, *TPMT*, and *VKORC1)*[4-7]
- NICE guidance on *CYP2C19* testing in people offered clopidogrel post-ischaemic stroke or transient ischaemic attack was also included[8]

Base case
- In the base case, our model includes the cost-effectiveness estimate of PGx testing in five of the 12 genes in the Mantara® PGx DNA Test; *CYP2D6* testing for women with breast cancer, *TPMT* for people with autoimmune disease, *CYP2C9* and *VKORC1* for people with atrial fibrillation, CYP2C19 in people post-ischaemic stroke or transient ischaemic attack
- These results represent a Mantara® PGx DNA Test consisting of only the genes and indications we have included, and that all the recommendations were acted upon

Cost-effectiveness findings
- Below a threshold of £20,000 per QALY, Mantara® PGx DNA Test was found to be cost-effective at £9,654 per QALY

Scenario analyses
- Scenario analyses generated variable ICER estimates, reflecting uncertainty in the evidence base and the differing contribution of individual gene-drug pairs

Evidence gap
- Further evidence is needed to evaluate the full panel and its potential value across additional prescribing indications

Table 1. Model results

	Total costs	Total QALYs	ICER (Cost per QALY)
All modelled alleles: (*CYP2C19, CYP2C9, CYP2D6, TPMT, VKORC1*)	£95,137	9.85	£9,654

***Abbreviations**: ICER: incremental cost-effectiveness ratio; QALYs: quality adjusted life years.*

Limitations

- The model was limited to genes and indications with suitable UK cost-effectiveness evidence, so it does not capture the full value of the PGx test
- Inputs were drawn from multiple studies, datasets, and assumptions, which may vary in population, setting, and relevance to current NHS pathways
- The model assumed all actionable PGx recommendations were followed, but real-world uptake and prescribing behaviour may differ
- Adverse drug reaction costs and QALY impacts were based on general estimates rather than drug- or gene-specific values

Conclusions

- **The Mantara® PGx DNA Test was estimated to be cost-effective, with a base case ICER of £9,654 per QALY**
- **Adding PGx testing to the NHS Health Check could help guide treatment choices and reduce avoidable ADRs**
- **More UK evidence is needed to assess the full panel of genes, treatments, and real-world implementation**

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