

## The Electronic Medical Records and Genomics Network-Pharmacogenomics (eMERGE-PGx) Project

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Contemporary molecular biological tools continue to identify genetic components of drug therapy response variability, suggesting that genomics-guided drug prescribing – pharmacogenomics – is becoming more possible. With few formal investigations into the real-world health practice, implementation, and clinical outcomes, however, the need for evidence-based recommendations to allow these variables to be incorporated into clinical decision support is growing. To address this, a partnership between the Electronic Medical Records and Genomics Network (eMERGE) and the Pharmacogenomics Research Network (PGRN) was formed. Together they developed the eMERGE-Pharmacogenomics project (eMERGE-PGx). The eMERGE-PGx project is a multi-site initiative to return pharmacogenomic variants of known significance to electronic medical records (EMRs) for clinical care and to collect pharmacogenomic variants of unknown significance with phenotype data from EHRs for discovery and hypothesis generation. eMERGE-PGx has three objectives:

1. Deploy PGRNseq, a targeted sequencing reagent covering 84 pharmacogenes in more than 9000 patients likely to be prescribed drugs of interest across ten clinical sites
2. Integrate well-established, clinically-validated pharmacogenetic genotypes into the EHR with associated CDS alerts and to assess process outcomes of that implementation
3. Develop a repository for variant and phenotype data sets collected on the PGx cohort.

Here we report on the eMERGE network experience in the eMERGE-PGx project domains which broadly represent genomic medicine discovery and implementation elements: 1. Consent / Recruitment; 2. Sequencing; 3. Variant Validation; 4. EHR integration and Clinical Decision Support; 5. Clinician and Patient Education; 6. Discovery Analysis. We also describe some early products and results, including SPHINX ([www.emergesphinx.org](http://www.emergesphinx.org)), the **Sequence**, **PHenotype**, and **PHarmacogenomics Integration eXchange** web-based tool for hypothesis generation to further pharmacogenomics discovery, comparative implementation of return of results and clinical decision support across sites, and observed penetrance of rare variants' effects on lipid levels and ECG traits.

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