Operationalizing a specialty pharmacy-led pharmacogenomic service to support medication optimization during the first 100 days post-hematopoietic cell transplant

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Introduction

- Patients undergoing hematopoietic cell transplantation (HCT) require intensive supportive care management during the first 100 days following transplant. Commonly prescribed supportive care medications including antifungals, opioids, antidepressants, antiemetics, and proton pump inhibitors may be affected by pharmacogenomic (PGx) variability
- Although PGx testing can identify actionable drug-gene interactions, a structured workflow is needed to ensure PGx results are consistently incorporated into clinical decision-making across transitions of care. Specialty pharmacy services are uniquely positioned to support longitudinal medication review and implementation of precision medicine strategies

Objective

To describe the implementation and workflow integration of a specialty pharmacy-embedded PGx service and evaluate its operational performance supporting medication optimization during the first 100 days following HCT

Specialty Pharmacy Pharmacogenomic Service

Goals of the Service

- Integrate pre-emptive PGx testing into transplant care
- Perform longitudinal medication management reviews
- Identify actionable drug-gene interactions
- Support medication optimization through pharmacist recommendations
- Facilitate communication between specialty pharmacy and the HCT multidisciplinary team
- Expand precision medicine services within specialty pharmacy practice

Novelty

- Specialty pharmacy-led PGx review extending through Day +100 post-transplant
- Scheduled pharmacist assessments rather than passive PGx result availability
- Integration of pharmacist review and EMR clinical decision support (CDS)
- Longitudinal follow-up across inpatient and outpatient settings
- Standardized EMR communication workflow to providers and clinic pharmacists

Figure 1. IMPPACT Specialty Pharmacy Workflow

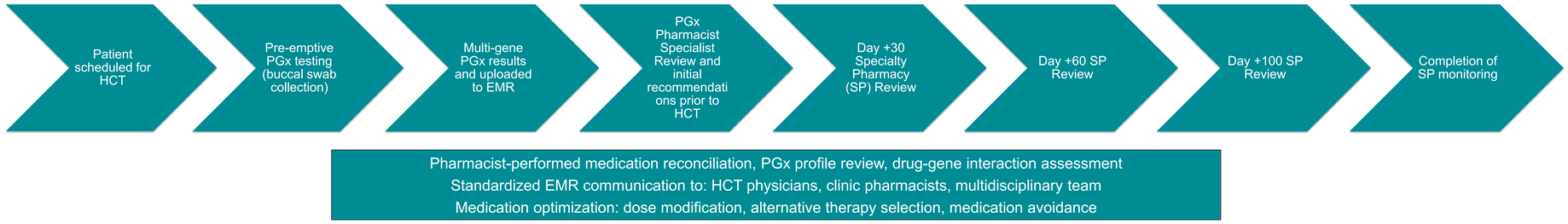

Figure 2. Specialty Pharmacy Impact

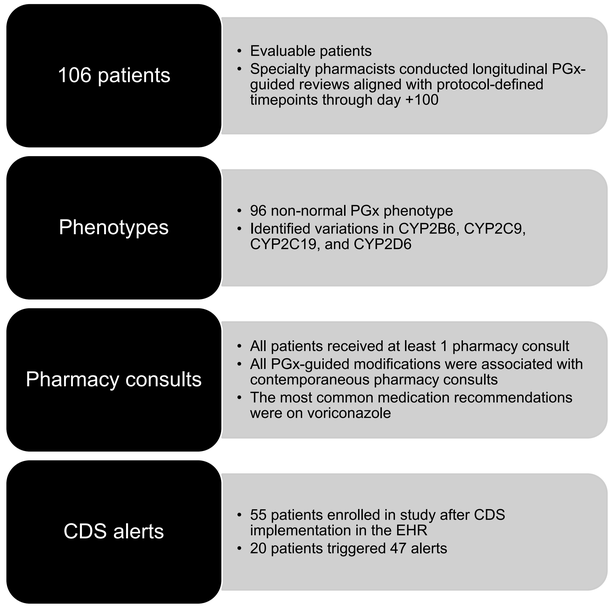

Table 1. Study Population

Characteristic	Result
Consented	110
Enrolled	109
Evaluable	106
Median Age (years)	63
Female (%)	43
Multiple Myeloma (%)	58
Autologous HCT (%)	72
Allogeneic HCT (%)	28

Table 2. CDS Alert Distribution

Medication	%
Tramadol	38
Voriconazole	36
Proton pump inhibitors	13
Ondansetron	11
Paroxetine	2

Table 3. Example PGx-Guided Interventions Through Specialty Pharmacy Review

Medication/ Class	Gene	Phenotype of interest	Recommendation
Voriconazole	CYP2C19	Rapid or Ultrarapid Metabolizer	Increase maintenance dose (empirically) by 50% or consider alternative antifungal
Tramadol	CYP2D6	Intermediate Metabolizer	Consider alternative analgesic if inadequate response
Ondansetron	CYP2D6	Ultrarapid Metabolizer	Consider alternative antiemetic because of potential for reduced efficacy
Escitalopram	CYP2C19	Ultrarapid Metabolizer	Switch to alternative antidepressant (example duloxetine) due to reduced exposure

Discussion

Key Findings

- A health system-integrated specialty pharmacy service successfully operationalized scheduled pharmacogenomic (PGx)-guided medication review
- 96% of patients demonstrated potentially actionable PGx variability
- The study assessed broad PGX-guided supportive care using symptom scores but found no significant difference; targeted approaches to pain management and other individual symptoms may be an alternative strategy
- Integration of pharmacist review and clinical decision support (CDS) in the EMR created a scalable precision medicine model

Limitations

- Difficult to tease out interventions that were made based on pharmacist recommendations specifically, the impact of CDS cannot be understated
- Having PGx pharmacist specialists available was critical, potentially limiting general applicability
- Long term impact (beyond D+100) not evaluated

Conclusion

- PGx information is being utilized to tailor drug therapy to individual patients, in oncology and other areas of care
- Specialty pharmacy services offer a vehicle for pharmacists to engage with and assist in optimizing medications based on PGx profiles
- Support for PGx services within specialty pharmacy should be considered

Future Directions

- Expand beyond D+100
- Additional oncology populations with specialty pharmacists actively reviewing genomic data for oncolytic therapy decision support as well as for supportive care
- Non-oncology populations
- Evaluations of provider acceptance
- Evaluation of economic impact

Resources

1. Patel JN, Wiebe LA, Dunnenberger HM, McLeod HL. *Value of supportive care pharmacogenomics in oncology practice*. Oncologist. 2018; 23: 956-964.
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3. Patel JN, et al. *Evaluation of CYP2C19 genotype-guided voriconazole prophylaxis after allogeneic hematopoietic cell transplant*. Clin Pharmacol Ther. 2020.
4. Patel JN, Arnall J, Jandrisevits E, et al. *Pharmacogenomics-guied supportive oncology: A tale of two trials*. Contemporary Clinical Trials. 2021; 105: 106391.

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