Prospective Randomized Study Using Pharmacogenetics to Customize Postoperative Pain Medication following Hip and Knee Arthroplasty
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INTRODUCTION:
Pharmacogenetics (PGx) studies a patient’s genetic makeup to predict how they will metabolize certain medications. The purpose of this study was to determine whether customizing postoperative pain medication using PGx test results could reduce pain and opioid usage following total joint replacement (TJR).
METHODS:
Buccal swabs were collected preoperatively from 107 primary TJR patients. PGx testing was performed for genetic variants on a panel of 16 genes, including CYP2D6, CYP2C9, OPRM1, and CYP1A2, which affect the pharmacodynamics and pharmacokinetics of NSAIDs and many opioids. Patients were randomized to a control group or custom group and blinded to their group. The control group was prescribed oxycodone, tramadol, and celecoxib for postoperative pain management regardless of the PGx results. In the custom group, PGx test results were used to customize postoperative pain medications. If the standard meds were not normally metabolized, an alternative drug was used (hydromorphone for narcotics, meloxicam for NSAIDs). Patients recorded pain level (0-10 numeric scale) and all medications taken daily for 10 days following surgery. Medications were converted to mg morphine equivalents (MEQ).
RESULTS:
Genetic variations to standard pain medications occurred in 24 of the 107 patients (22.4%). The 10-day MEQ consumed by patients in the control group with genetic variants was 162.6mg. Patients in the custom group with genetic variants who had custom postoperative medication consumed only 86.7mg MEQ in the same timeframe (p=0.126). The control group demonstrated a higher 10-day average pain score of 4.2 vs. the custom group pain level of 3.1 (p<0.05).
DISCUSSION AND CONCLUSION:
Using PGx testing is a novel and attractive concept to customize pain medications to align with an individual’s ability to metabolize those medications. This study shows that customizing postoperative pain prescriptions based on pharmacogenetic testing can lead to both lower pain levels and opioid usage.