Prescription Opioid Use is Associated with Comorbid Non-cancer Illnesses among Chronic Pain Patients

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INTRODUCTION

High rates of opioid prescriptions for chronic noncancer pain (CNCP) have raised questions about which factors influence physicians' decision-making when prescribing opioids. It has been proposed that prescribing opioids follows a concerning pattern known as "adverse selection", wherein CNCP patients with greater rates of medical diagnoses and higher comorbidity scores, who are also at highest risks of poor outcomes, are more likely to be selected by physicians for opioid therapy. In this study, we aim to assess the contribution of pain-associated non-cancer illnesses (NCIs) to prescription opioid use among a large cohort of CNCP patients. Predictive modeling was used to understand the patients' characteristics determining increased opioid use across NCIs.

METHODS

Population: This study used data from the UK Biobank, a prospective cohort of over 500,000 participants. CNCP patients were considered as those reporting pain interfering with their usual activities for more than 3 months. Data was analyzed from 195,808 CNCP participants.
Measures: Regular use (i.e., most days of the week for the last 4 weeks) of prescription opioids and self-reported non-cancer illnesses were identified at data collection visit.
Analysis: Associations between opioid use and 11 major NCIs were described using odds ratios (ORs) with 95% confidence intervals(95%CI). Also, associations between the total number of reported NCIs with opioid use were described using ORs. A machine learning approach was used to develop two separate predictive models of opioid use. A total of 77 pain agnostic features, including sociodemographic, lifestyle, mental health, mood, and anthropometric measures (i.e., pain-agnostic model), and a total of 16 pain-related features, including the location of the acute and chronic pain (i.e., pain model) were entered in the predictive models. Models' diagnostic abilities were evaluated using Cohen's-d effect sizes comparing each NCI group with the NCI-free group.

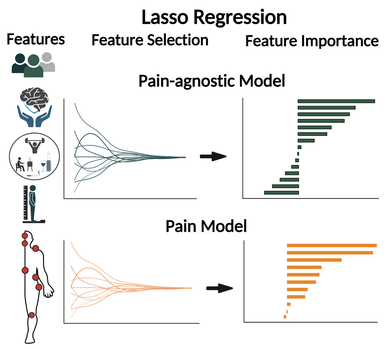

Figure 1. Predictive models. Using the patients' characteristics, we derived pain and pain-agnostic models that predicted the use of prescription opioids in CNCP patients.Models were trained using a sample of 178,763 CNCP patients from the Uk Biobank baseline data (2006-2011) (i.e., train set) and validated using a left-out sample of 17,045 CNCP patients attending in a follow-up visit (9 years later) (i.e., test set). Selected features correspond to the most predictive variables with non-zero weights after penalization. Positive weights indicate positive correlation,while negative weights indicate negative correlation with opioid use.

RESULTS

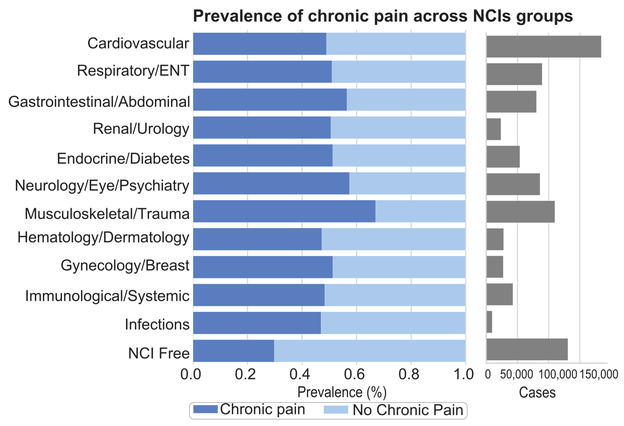

Figure 2. Prevalence of chronic pain stratified by 11 major NCIs. Chronic pain was more prevalent in participants diagnosed with at least one non-cancer illness than diagnosis-free (NCI-free) participants.

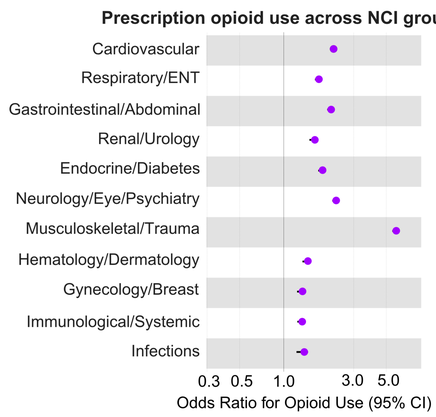

Figure 3. Associations between each NCI group and prescription opioid use. Forest plots show ORs of using opioids given each NCI group. Opioid use was associated with all NCIs, with ORs ranging from 5.5, [95%CI:5.49,5.84] for neurological and psychiatric illnesses and 1.29, [95%CI:1.24-1.35] for immunological comorbidities.

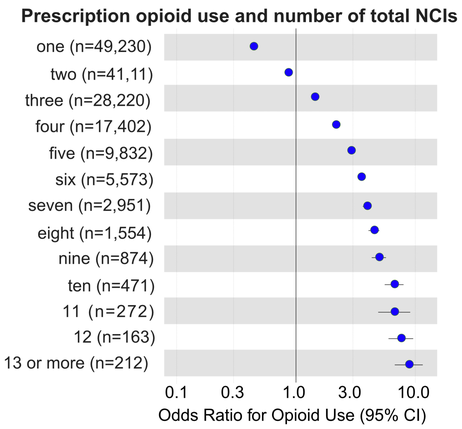

Figure 4. Associations between number of reported NCIs and opioid use in CNCP patients. Prescription opioid use was strongly associated with the number of non-cancer medical illnesses in CNCP patients, and the likelihood of using opioids linearly increased with the number of illnesses.

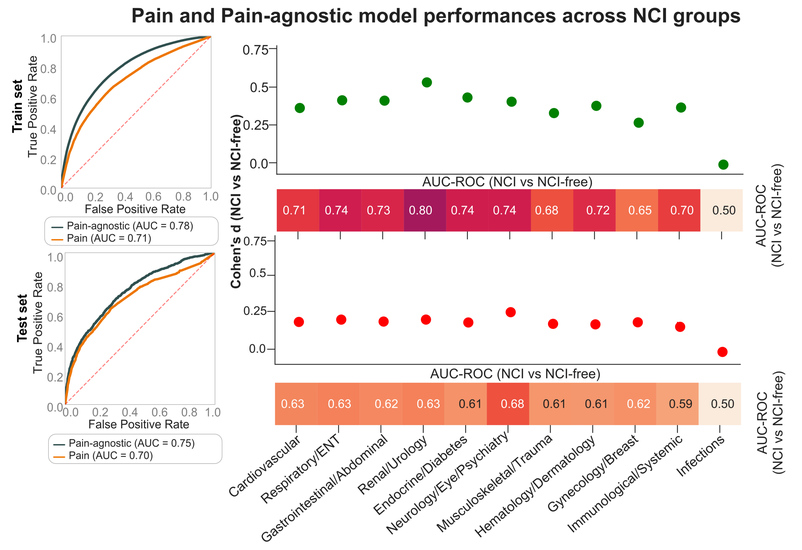

Figure 5. Pain and pain-agnostic models predicting opioid use. Area Under the Receiver Operating Curves (AUC-ROC) showing classification accuracy of the two Lasso regression models (i.e., pain-agnostic and pain) in the train (top) and test set (below). Both models obtained good performance in the test set. The diagnostic ability of the pain (below) and pain - agnostic (top) models to classify the 11 NCI groups is displayed using Cohen's *d* and measured with AUC-ROC. Standard errors were estimated from 10,000 bootstrap resampling.The pain-agnostic model showed stronger discriminability between NCI groups and the NCI-free group compared to the pain model, with moderate effect sizes across all categories (average Cohen's-$d_{pain\text{-}agnostic\ model}$ =0.40, P-value<0.001, and average Cohen's-$d_{pain\ \ model}$ =0.19, P-value<0.001).

CONCLUSION

- Our results suggest that opioids are more frequently prescribed to patients suffering from comorbid conditions, and that associations between chronic pain and opioid use may be confounded by pain-associated illnesses.
- CNCP patients diagnosed with an NCI had significantly higher pain-agnostic risk scores compared to the NCI-free group, indicating that opioids may be prescribed to co-treat the patients' pain and overall poor functioning.

References

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