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(160) Extracting unstructured data from electronic health records (EHR) to enhance opioid risk assessment in patients with chronic non-cancer pain

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Clinical guidelines for the use of opioids in chronic non-cancer pain recommend assessing risk for aberrant drug-related behaviors (ADRBs) prior to initiating opioid therapy. Despite recent drastic increases in prescription opioid misuse and abuse, the use of screening tools in assessing risk of ADRB by clinicians continues to be underutilized. We hypothesized that Natural Language Processing (NLP) techniques may support clinicians in risk assessment of patients considered for opioid therapy. Using a retrospective cohort of 3,672 chronic non-cancer pain patients with at least one Opioid Agreement (OA) between 1/1/2007 and 12/31/2012, we examined the availability of EHR structured and unstructured data to populate three ADRB risk tools, which varied in length, complexity and assessed patient life events: Opioid Risk Tool (ORT); Diagnosis, Intractability, Risk, Efficacy (DIRE); and Screener and Opioid Assessment in Patients with Pain (SOAPP). We developed structured data queries and NLP algorithms for processing unstructured data for each tool, and evaluated performance of these tools in predicting future ADRBs. Sufficient EHR structured and unstructured data existed to populate the ORT and DIRE, but not the SOAPP. At the time of their most recent OA, ORT-based classification identified 41.8% of patients as low risk, 28.2% moderate risk and 29.0% high-risk for ADRBs. DIRE classification identified 41.2% of patients as unsuitable (score <14) and 58.8% as possible (score 14+) candidates for long-term opioid therapy. During a year following the OA, 22.2% of patients had ADRBs. Compared to ORT low risk patients, moderate/high risk patients were 2.2/4.8 times more likely to have ADRBs, respectively. Patients with DIRE scores <14 were 2.9 times more likely to have ADRBs than those with scores 14+. Our findings suggest that NLP techniques have potential utility to support clinicians in screening chronic non-cancer pain patients considered for opioid therapy. Study supported by Pfizer Inc.

(161) What is the likelihood of opioid-induced nausea and vomiting (OINV) in patients with a history that is only suggestive of OINV?

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Many patients prescribed an opioid for the acute management of pain develop OINV, especially patients who have previously experienced OINV. In most cases, however, the practitioner cannot obtain a definitive history to predict or prevent this outcome and must rely on gray historical factors to make the judgment which patients might develop OINV. By using a Nausea-Prone Questionnaire (NPQ) to identify concrete evidence of previous OINV or other conditions that might predispose patients to nausea and/or vomiting, we had the opportunity to observe OINV outcomes in a convenience sample of these presumably less at-risk patients, i.e., patients who are only "possibly nausea-prone" (PNP). Adult patients (≥18 yrs) scheduled for oral surgery completed the NPQ at the pre-op appointment, and PNP status was designated according to pre-determined criteria. Under double-blind conditions PNP patients who reported moderate or severe post-operative pain were randomly allocated to treatment with hydrocodone 7.5 mg/acetaminophen 325 mg (HC) or placebo. They measured nausea and vomiting on nausea intensity and vomiting frequency scales and documented the use of anti-emetics over 5 post-op days. Of 46 PNP patients treated with HC, 28 (61%) reported moderate or severe nausea at least once, 10 (22%) vomited at least once, and 11 patients (24%) required at least 1 dose of an antiemetic. Each outcome differed significantly from placebo-treated patients (all $p<0.05$). There were no noticeable differences in outcomes between men and women. These findings indicate that a surprisingly high proportion ($\sim$ 60%) of patients with acute pain who are "only" possibly at risk of OINV actually develop this condition after using an opioid-containing analgesic. The NPQ appears to be a sensitive instrument for identifying them. Future research will use the NPQ in other patient groups in this susceptible population. Supported by a grant from Charleston Laboratories.

(162) Neuroticism influences affective but not sensory ratings of experimentally induced pain

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Neuroticism has previously been linked to greater pain sensitivity. Here we aimed to investigate differences in pain sensitivity in individuals scoring high and low on neuroticism. The short version of the big five inventory (BFI-K) was administered as a self-assessment of personality. The BFI-K: Neuroticism score (mean=2.48, SD=0.84, minimum: 1.0, maximum: 4.74) was dichotomized into high and low neuroticism scores based on the upper tertile of participants. Data from a total of 61 participants (mean age=24.34 SD=6.69, 45 women) was available for analysis. Those with a BFI-K: Neuroticism <2.83 were considered low on neuroticism (N-, n=41), those with a score ≥ 2.83 were considered high on neuroticism (N+, n=20). N- and N+ did not differ on age (p=.295) but gender (p=.040). Cold pain sensitivity was assessed by immersing the non-dominant hand up to the wrist in an acrylic glass tank with circulating water to prevent local warming (mean water temperature $5.2 \pm 1.48^{\circ}$C). The latencies to the first pain sensation (pain threshold) and to the intolerable pain (pain tolerance, cutoff time of 4 minutes) were measured with a stopwatch in seconds. Following the cold pain stimulation, subjects completed the short form of the McGill Pain Questionnaire (SF-MPQ). Pain threshold and pain tolerance did not significantly differ between N+ and N-. When investigating the single descriptors of the SF-MPQ sensory and affective pain scale, chi-squared analyses revealed a significant difference between those scoring high on neuroticism compared to those scoring low on neuroticism on the affective scale ($x^2_{(8)}$=18.694, p=.017), but not on the sensory scale ($x^2_{(20)}$=23.520, p=.264). Linear regression analysis on the dependent pain measures revealed that neuroticism (BFI-K Neuroticism score) was a significant predictor (β=.271, p=.045, R^2=.091) of affective pain reporting (SF-MPQ: Affective Scale) when controlling for age and sex.

(163) Sub-clinical range of pain catastrophizing moderates the effect of pain intensity on opioid prescription

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Pain catastrophizing (PC) can predict pain severity, duration, and opioid craving, but its associations with opioid prescription are inconsistent. We aimed to elucidate the association between PC, opioid prescription, and average VAS pain in chronic pain patients. PC data were obtained from the Pain Catastrophizing Scale (PCS) along with VAS from within the Collaborative Health Outcomes Information Registry (CHOIR) for 636 patients. Opioid prescription data were obtained via retrospective chart review. Controlling for demographic variables, Generalized Additive Model (GAM) showed non-linearity in the effect of PC on opioid prescription. In our previous work, change point analyses with bootstrapping discovered a recurrent change point at PCS score 20, suggesting a shift in factors associated with opioid prescription. We have now further characterized the effects of pain intensity and age on opioid prescription using Generalized Linear Models (GLM). We discovered that the demographic variable, age, remained significant in both the group with PCS less than 20 (OR 1.35 per decade; p=0.026) and in the group with PCS greater than 20 (OR 1.22 per decade; p=0.046). In contrast, pain intensity, as measured by self-reported 7-day average VAS, displayed differential behavior between these groups. In subjects with PCS less than 20, each unit increase in average VAS was associated with increased chances of opioid prescription with an odds ratio of 1.16 (p=0.017). However, in subjects with PCS greater than 20, there was neither an observed nor a statistically significant association between VAS and opioid prescription. We previously found that there were systematic differences in the predictors of opioid prescription around PCS 20, a score typically deemed clinically insignificant. Now, we see that while pain intensity can be a predictor for opioid prescription, this association is moderated by the novel, subclinical range of PC. This subclinical range underscores the importance of treating emerging catastrophizing tendencies.