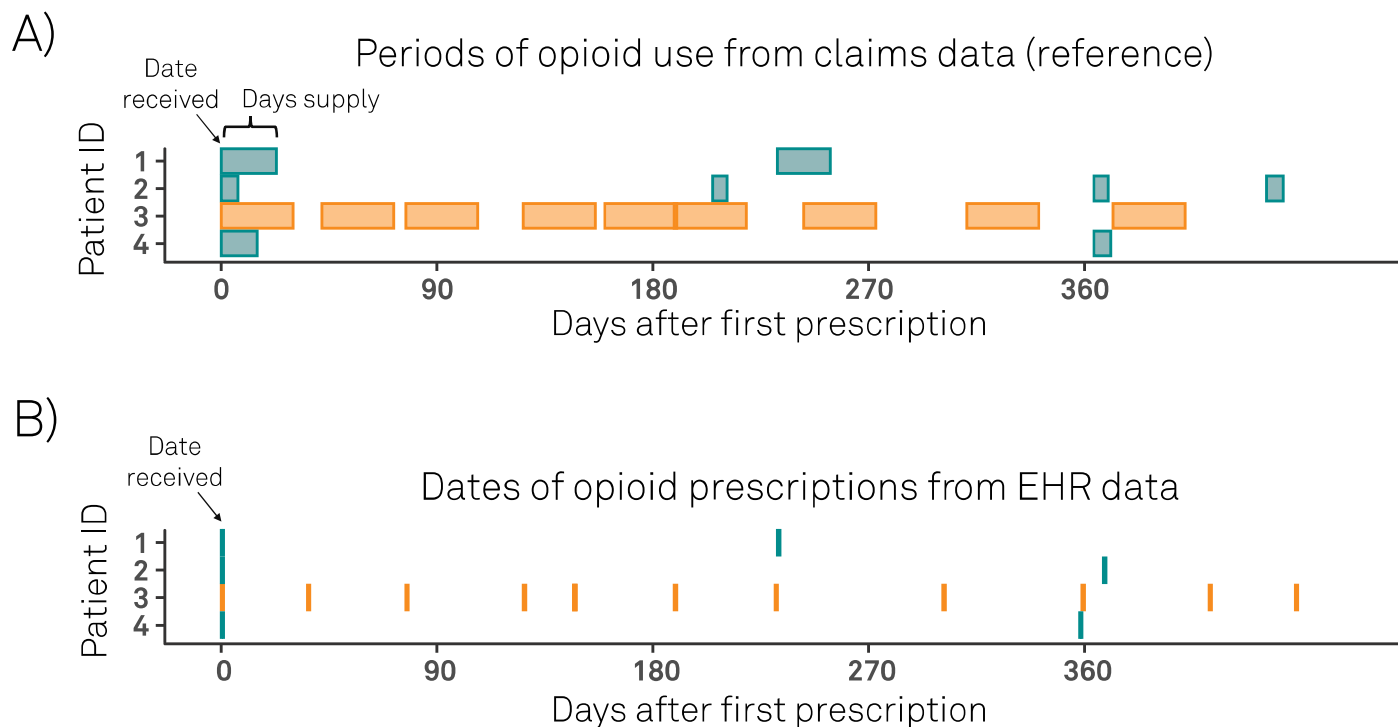




Figure 1

## Comparing Prescription Patterns of Four Example Patients



A) Pharmacy claims for opioids from four example patients. One patient (3, orange) displays chronic opioid use consistent with the reference definition. B) EHR prescribing records for the same four patients. The same patient (3, orange) also displays chronic opioid use based on the new EHR derived definition.

# Pain Points

## Identifying chronic opioid use at the point of care

By Jeff Mohl, PhD, and Elizabeth L. Ciemins, PhD, MPH, MA

**T**he topic of opioid use is fraught with complexity and consequence, both at the societal level and from the perspective of healthcare providers managing patients' pain. Opioid analgesics are a powerful tool to treat acute pain, but when this acute use leads to long-term chronic use and addiction, the harms can easily begin to outweigh the benefits.

This risk is particularly prevalent for chronic pain conditions such as osteoarthritis (OA), which afflicts more than 32 million Americans,<sup>1,2</sup> of whom nearly a quarter are prescribed an opioid in any given year.<sup>3</sup> While opioid use can be justified in treating these patients, it is crucial to prevent progression to chronic opioid use, which is less effective for controlling pain than treatment with safer over-the-counter medications.<sup>4</sup>

Even with the intent to avoid chronic opioid use, it is often challenging to systematically evaluate and assess. First, there is no universally accepted definition of what constitutes "chronic" opioid use, leading to variability in understanding and approach. Second, existing definitions typically rely on pharmacy fill data maintained by insurance providers, which many healthcare organizations (HCOs) cannot access. Statewide registries or prescription drug monitoring programs address this issue to an extent, but their implementation and success have been inconsistent.

Together, these systems often fail to provide relevant information to care providers, making it challenging to appropriately treat patients' pain. This oversight can result in numerous negative outcomes for providers and patients, such as an unexpected

insurance denial of an important medication or unintentional progression to chronic opioid use and dependence.

We set out to address this problem by developing a tool to identify chronic opioid use automatically using only the data most health systems have ready access to: the electronic health record (EHR). By leveraging a unique data resource with both EHR derived prescription data and pharmacy fill claims, we defined and tested a new method for identifying chronic opioid use in patients receiving opioids.

## Approach

We identified 16,147 patients, sourced from 13 AMGA member organizations with both EHR prescribing and claims-based pharmacy fill data, who had a diagnosis of OA and a new prescription for an opioid between March 2017 and February 2019. We then followed these patients longitudinally for one year from that first prescription to determine whether they developed chronic opioid use at any point.

Because this is the first attempt to define chronic opioid use with EHR data, we used a reference definition based on pharmacy claims to identify patients who should be captured by our new definition.<sup>5</sup> This reference was defined as 90 days

of continuous opioid supply, coming from at least three prescriptions and with no gaps longer than 30 days. We used this reference definition as a guide when developing the new EHR definition, taking into account the differences between EHR and claims-based data.

Ideally, the reference claims definition would directly translate into EHR data. Unfortunately, EHRs commonly do not capture key components of the reference definition, such as dosage and the number of days covered. To find the closest approximation using EHR-captured data, we engaged in an iterative process of data-driven development and clinician feedback.

## Results

Using the claims reference definition, 6% of OA patients with an opioid prescription experienced chronic opioid use within the year. Four example patients illustrate distinct usage patterns among chronic users (Figure 1A, orange) and those exhibiting intermittent use (Figure 1A, blue) not readily apparent without longitudinal analysis.

After multiple iterations of development and feedback, the new EHR definition was determined as: a minimum of 83 days



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of opioid use with three or more prescriptions spaced no more than 60 days apart. Based on this definition, we identified 5.7% of patients as experiencing chronic opioid use. Applying the new EHR-based definition to the same example patients reveals a clear pattern of chronic use and, importantly, does not mis-identify non-chronic use patients as chronic (Figure 1B).

In the broader sample of all 16,147 patients, the new definition had 97.7% specificity and 52.2% sensitivity relative to the reference. These data indicate the two definitions agreed when a patient was chronic over 97% of the time, but the new definition missed a substantial fraction of the patients identified by the reference definition. This discrepancy was most likely caused by patients receiving opioids from multiple sources (e.g., different providers or HCOs), which would be captured by insurance data but not necessarily in the EHR. This is apparent when comparing claims-based (Figure 1A) and EHR data (Figure 1B), where there are occasional prescriptions in the claims data that are not picked up.

## Conclusion

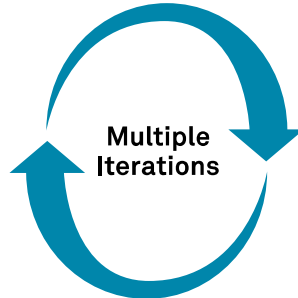
A significant fraction of patients with chronic pain developed chronic opioid use after being prescribed an opioid—more than 5% of OA patients in our sample. Chronic use can lead to addiction or other negative consequences. We developed a new definition of chronic use based on EHR data, which compared favorably with a reference definition relying on claims data, which are not readily available across HCOs. When these definitions disagreed, it was usually due to missing data in the EHR (e.g., prescriptions written by providers outside the EHR). This highlights the importance of statewide registries and patient communication when seeking a complete picture of a patient's opioid use.

While insurers often have the data to identify chronic use patients, our new definition based on EHR data allows identification within the health system itself, giving providers the information necessary to best care for their patients and facilitating organization-wide quality improvement initiatives focused on reducing harmful opioid use. In a related project, we took this work a step further by integrating this definition into a predictive model to proactively identify patients who were likely to develop chronic use.<sup>6</sup>

While this method was developed and tested among OA patients, the principles are transferable to any patients with chronic pain who may be prescribed opioids. By moving the identification of this issue earlier in the care delivery process

Figure 2

## Developing an EHR-Based Definition of Chronic Use



### Data-Driven Development

- ▶ Evaluate prescription patterns
- ▶ Compare data sources (EHR vs. claims)
- ▶ Quantitatively compare definitions

### Incorporate Clinical Expert Feedback

- ▶ Solicit feedback from practicing addiction specialist
- ▶ Judge face validity: capture “spirit” of chronic use
- ▶ Inform natural cut points

(in the provider office, rather than in the hands of insurance providers), this tool can improve the quality of information available for patients and providers to engage in shared decision-making. [GRJ](#)

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**For more information on this work and the related project predicting chronic opioid use proactively, see *Predicting Chronic Opioid Use Among Patients With Osteoarthritis Using Electronic Health Record Data* at [doi.org/10.1002/acr.25013](https://doi.org/10.1002/acr.25013).**

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