Clinical Decision Support to Increase Naloxone Co-Prescribing from the Inpatient Setting

Jacob A Lebin MD[1], Kaitlin Mitchell MPH[1], Katy E Trinkley PharmD PhD[2,3], Susan L Calcaterra MD MPH MS[4], Zhixin Lun PhD[5], Colin Hensen MS[5], Jason A Hoppe DO[1]

1. Department of Emergency Medicine, University of Colorado, Aurora, CO, USA
2. Adult and Child Center for Outcomes Research and Delivery Science Center, University of Colorado, Aurora, CO, USA
3. Department of Family Medicine, School of Medicine, University of Colorado, Aurora, CO, USA
4. Division of Hospital Medicine, Department of Medicine, University of Colorado, Aurora, CO, USA
5. Department of Biostatistics and Informatics, Colorado School of Public Health, University of Colorado, Aurora, CO, USA

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Background

- Co-prescribing naloxone alongside opioid prescriptions reduces fatal opioid overdose risk in patients discharged from inpatient care, yet its adoption remains limited.
- Clinical decision support (CDS) tools are effective in increasing naloxone co-prescribing in emergency and primary care settings, but data from the inpatient setting is sparse.
- To address the need for expanded naloxone co-prescribing from the inpatient setting, we designed and implemented an interruptive, EHR-integrated, provider-facing CDS to facilitate co-prescribing of naloxone with high-risk opioid prescriptions prescribed at hospital discharge.

Methods

- Design: This observational, pre-post study evaluated an EHR-embedded CDS tool implemented within an integrated health system between July 10, 2011 – July 15, 2023.
- Study Sample: Adult patients discharged from inpatient care with opioid prescriptions that met the Centers for Disease Control and Prevention high-risk criteria for opioid prescribing.
- Interventions: A multidisciplinary team designed an interruptive CDS best practice alert to identify high risk opioid prescriptions. The CDS offered prescribers a one-click option to add a naloxone co-prescription.
- Main Measures: Outcomes are organized under the RE-AIM implementation science framework, with the primary outcome, Effectiveness, measured by the proportion of patients receiving a naloxone prescription. Secondary outcomes include patient Reach, clinician Adoption, and fidelity to Implementation. Bayesian structural time-series models were used to evaluate differences in outcomes.

Results

Figure 1: Interruptive clinical decision support alert (© 2024 Epic Systems Corporation), which triggers based on CDC opioid prescribing guideline high risk criteria.

	All inpatient discharges in period before intervention (N=457,524)	Subset: Inpatient discharges in period before intervention with an opioid prescription (N=203,270)	All inpatient discharges in period after intervention (N=355,465)	Subset: Inpatient discharges in period after intervention with an opioid prescription (N=122,643)	Subset: Inpatient discharges in period after intervention with CDS exposure (N=7,799)
Sex					
Female	255,513 (55.8)	115,089 (56.6)	189,613 (53.3)	66,712 (54.4)	3,718 (47.7)
Male	201,944 (44.1)	88,173 (43.4)	165,842 (46.7)	55,930 (45.6)	4,081 (52.3)
Other/Unknown	17 (<1)	8 (<1)	10 (<1)	1 (<1)	0 (<1)
Race					
White or Caucasian	344,853 (75.4)	158,926 (78.2)	268,898 (75.7)	95,974 (78.3)	6,270 (80.4)
Black or African American	37,328 (8.2)	13,365 (6.6)	25,821 (7.3)	7,595 (6.2)	422 (5.4)
Other/Unknown	75,119 (16.4)	30,919 (15.2)	60,629 (17.1)	19,045 (15.5)	1,106 (14.2)
Ethnicity					
Non-Hispanic, Latino/a, or Spanish Origin	383,782 (83.9)	174,488 (85.8)	293,984 (82.7)	103,972 (85.0)	6,776 (86.9)
Hispanic, Latino/a, or Spanish Origin	66,959 (14.6)	25,515 (12.6)	57,780 (16.3)	17,254 (14.1)	978 (12.5)
Other/Unknown	6,511 (1.4)	3,183 (1.6)	3,576 (1.0)	1,113 (<1)	44 (<1)
Insurance					
Public	289,818 (63.3)	123,016 (60.5)	229,459 (65.6)	76,486 (62.4)	5,221 (67.0)
Private/Other	145,639 (31.8)	70,410 (34.6)	110,294 (31.0)	40,762 (33.2)	2,219 (28.5)
Indigent	15,362 (3.4)	6,248 (3.1)	7,861 (2.2)	2,374 (1.9)	160 (2.0)
Military (VA)	6,664 (1.5)	3,596 (1.8)	7,849 (2.2)	3,039 (2.5)	190 (2.4)
Primary Language					
English	427,743 (93.5)	194,433 (95.7)	331,779 (93.4)	116,921 (95.4)	7,537 (96.7)
Spanish	18,257 (4.0)	5,651 (2.8)	159,04 (4.5)	3,944 (3.2)	1,669 (2.3)
Other/Unknown	11,419 (2.5)	3,170 (1.6)	7,503 (2.1)	1,669 (1.4)	77 (1.0)

Table 1: Characteristics of inpatient discharges before/after CDS implementation and with CDS exposure
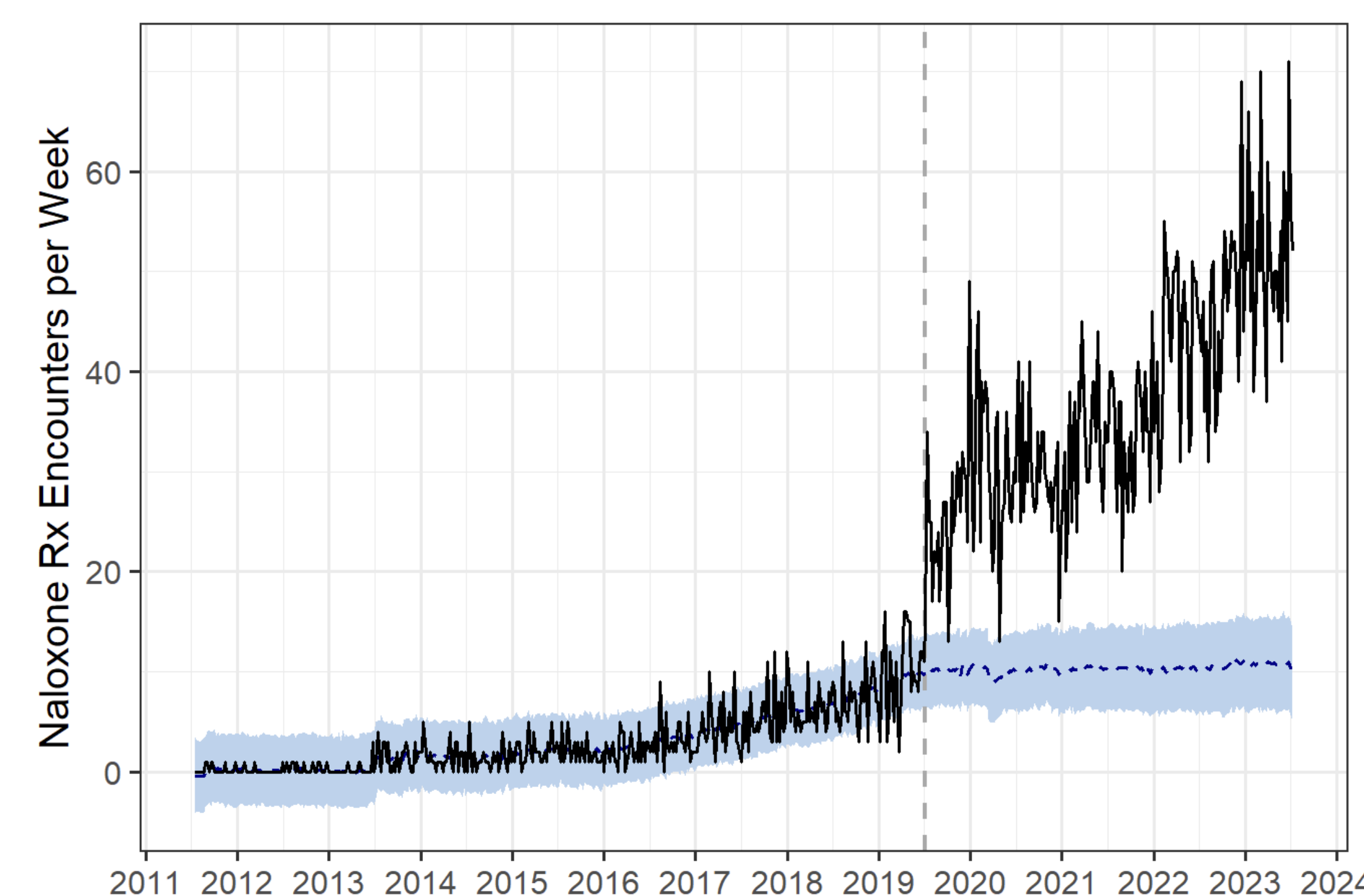

Figure 2: CausalImpact time series analyses of naloxone prescriptions before and after the implementation of intervention. The vertical dotted gray line represents clinical decision support go-live date. The horizontal dotted blue lines represent counterfactual estimates, and the surrounding light blue shading represents the 95% confidence interval of the counterfactuals.
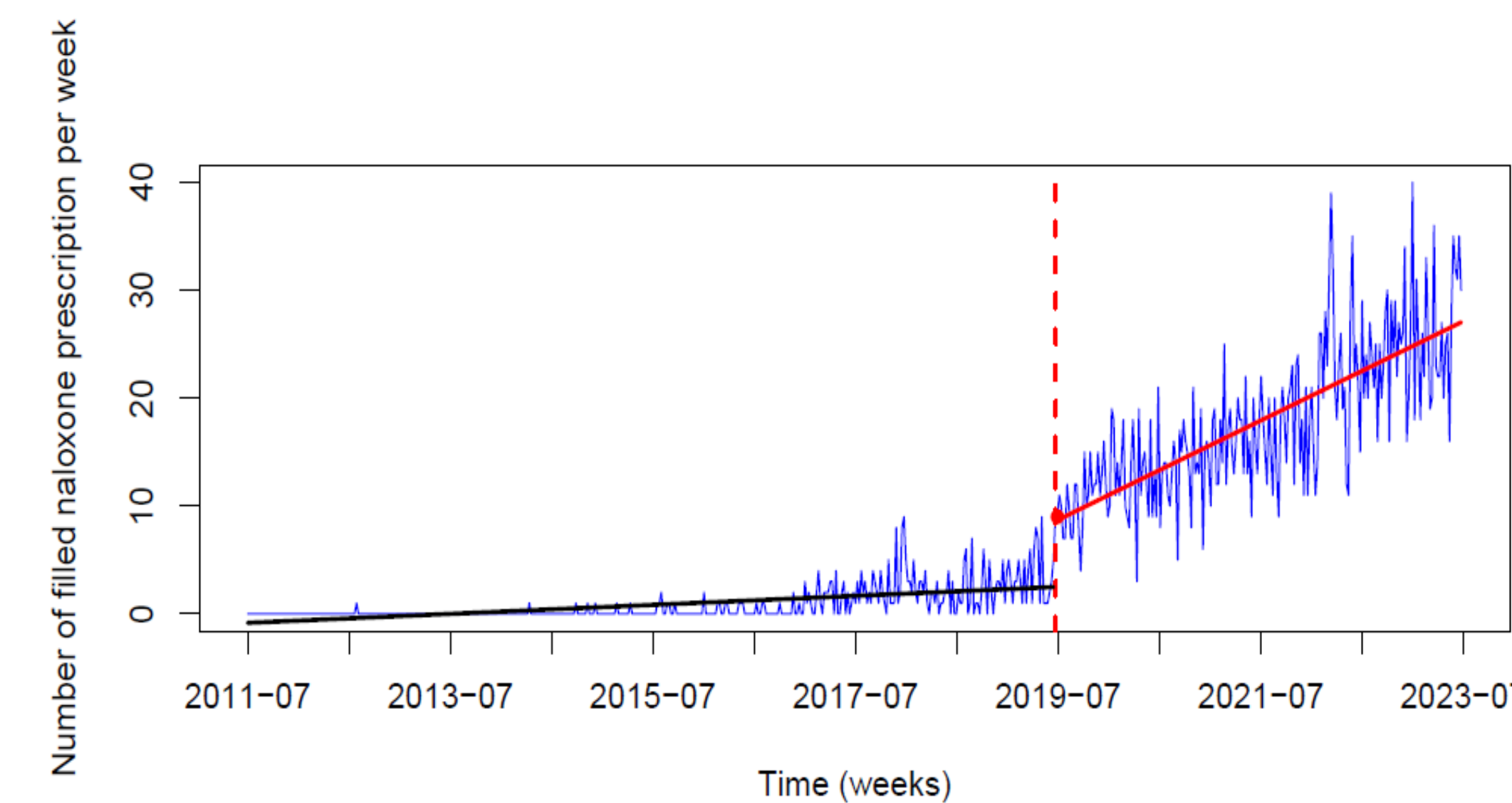

Figure 3: Time series plot of naloxone prescription fills per week (blue line). The vertical dotted red line represents CDS go-live date. Mann-Kendall test curve is shown in the solid red. The Mann-Kendall trend test result are as follows: tau = 0.803, p-value < 0.001.

Conclusions

- We found that an interruptive CDS design, triggered by routinely collected data available in the EHR, was associated with significant increases in naloxone co-prescribing with high-risk opioids on discharge from the inpatient setting.
- Despite the rapid increase in use of CDS, alert fatigue from interruptive alerts remains a significant challenge in their effective implementation.
- Despite concerns around cost, and consistent with other studies, our work demonstrates that patients fill the prescriptions at sufficient rates to justify a prescription model (compared to "take-home naloxone").

Implications

- CDS is an effective implementation strategy to increase CDC recommended naloxone co-prescribing for high-risk opioid prescriptions from the inpatient setting.
- This work highlights the utility of established implementation science frameworks, like RE-AIM, in the implementation and evaluation of complex health interventions.
- Widely accepted, low risk interventions can be particularly well-suited for CDS strategies with focused, interruptive designs.

Disclosures

Conflicts of Interest: The authors have no conflicts of interest to disclose.