



Assessing Drug Abuse Potential: Quantifying Social Media Postings

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Internet Monitoring Data

- Unstructured, free-text online forum posts.
 - *“I chewed some of my old fent patches n put the gel inside my cheeks, shot up a whole 20 oxy IR n took like 4 bars before all of this... I passed out clothes on n everything haha. I felt good, but felt like a waste...”*
 - *“recently i acquired one single 5mg hydrocodone pill. after some researching i have concluded that this isnt enough to get me high. im wondering if there are other drugs i could take with the hydrocodone that would amplify the effects”*
 - *“I guess I am in the minority here.....I haven't ever tried H, BUT I much prefer Opana to OC's, Fent (with the exception of the lollys), methadone, oxyfast, morphine, dilaudid, roxi's, etc....”*

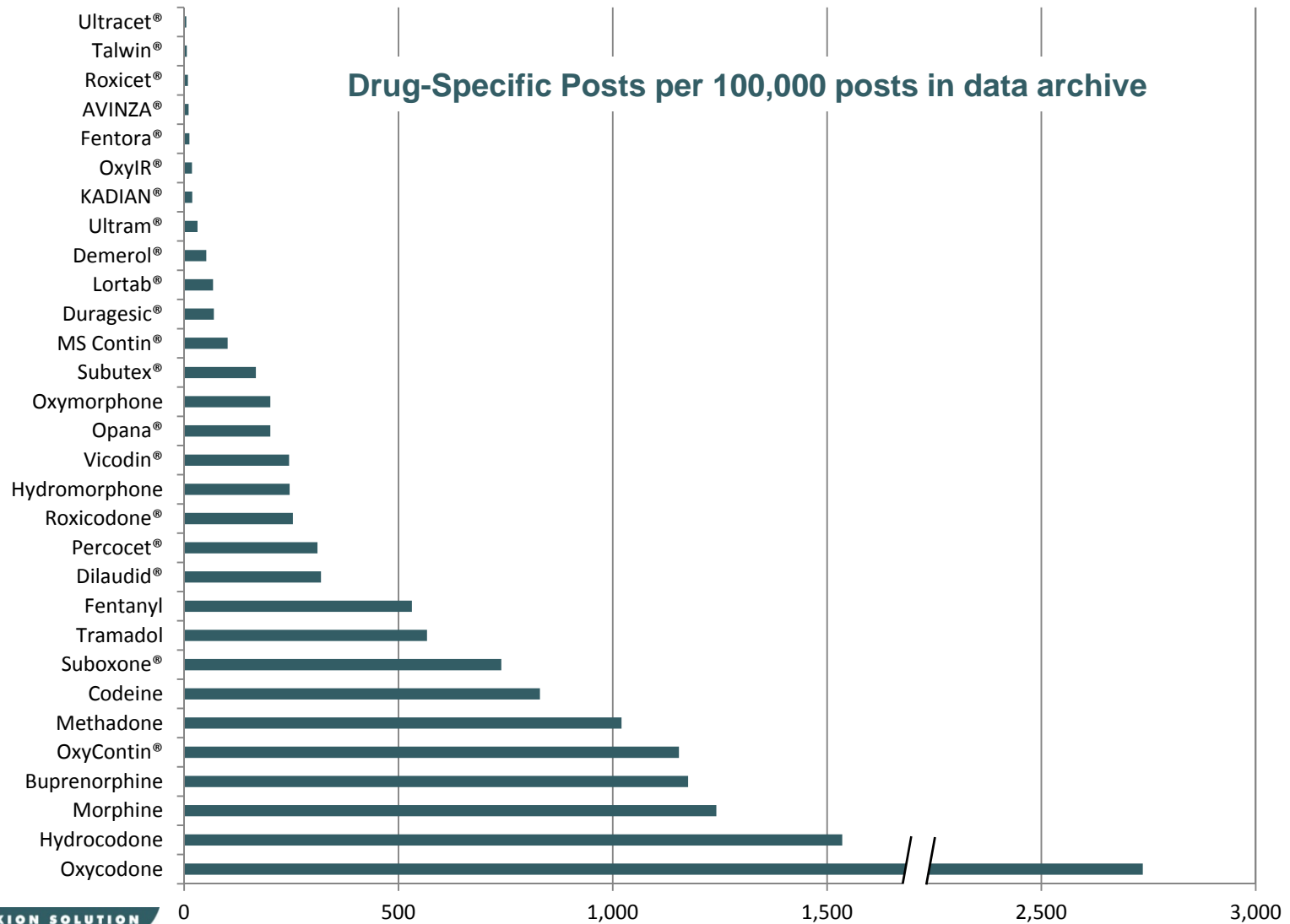
Internet Drug Discussion – Data Collection



Types of Internet Monitoring Analyses & Measures

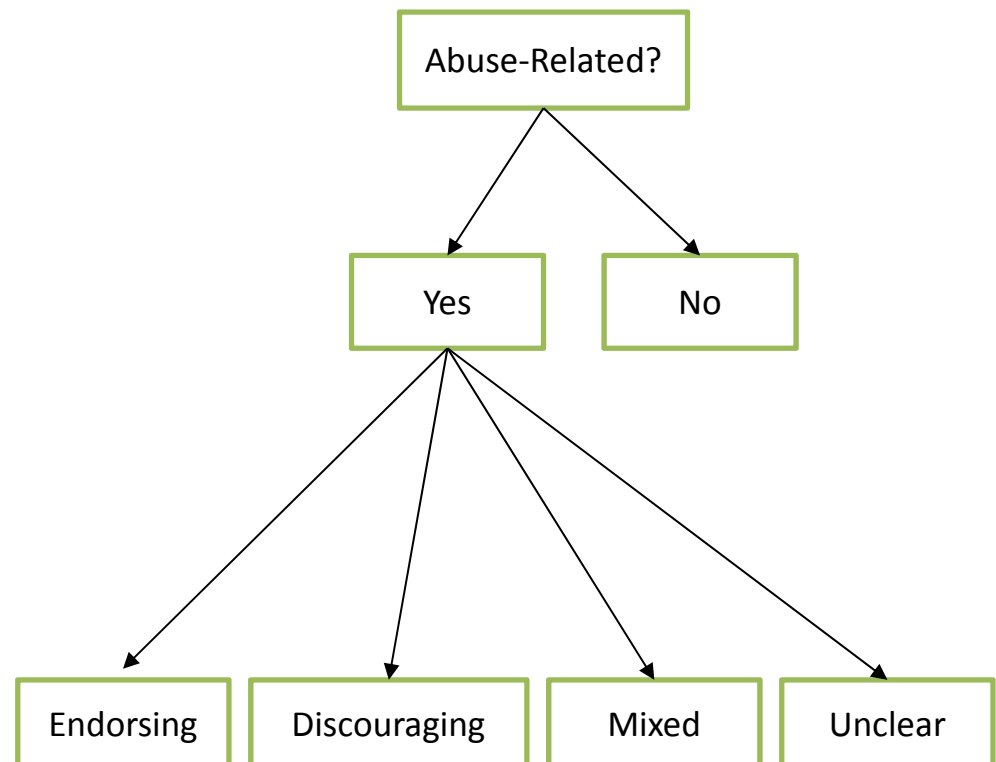
- **Discussion Level**
 - Proportion of posts, threads, and authors for specific drug.
- **Topic Analysis**
 - Review and coding to determine frequency of mentions of various topics (e.g., ROA, extraction).
- **Sentiment Analysis**
 - Endorsement Ratio (ERo) measures sentiment/preference regarding abuse of specific drug and comparators.
- **Recipe Tracking**
 - Unique recipes for tampering/manipulating drug products.

Comparison of Drug Discussion Levels



Sentiment/Content Analysis Overview

- Evaluation of the sentiment expressed regarding the recreational desirability of target drugs.
- Manual review by trained coders.
- 20% overlapping sample to ensure acceptable level of agreement between coders.



Sentiment Analysis Categories

- **Endorsing**: Endorse, promote, or facilitate abuse.
“I love Product A, it has the best buzz!”
- **Discouraging**: Strong negative opinions, experiences, or barriers to recreational use.
“Ugh, that drug is horrible. Totally not worth the effort...”
- **Mixed**: Both positive and negative material.
“Product B gives a great body high, but sometimes I get a bad headache afterwards.”
- **Unclear**: Unclear, neutral, or factual information.
“Product C is the newest oxycodone product from X Pharma.”

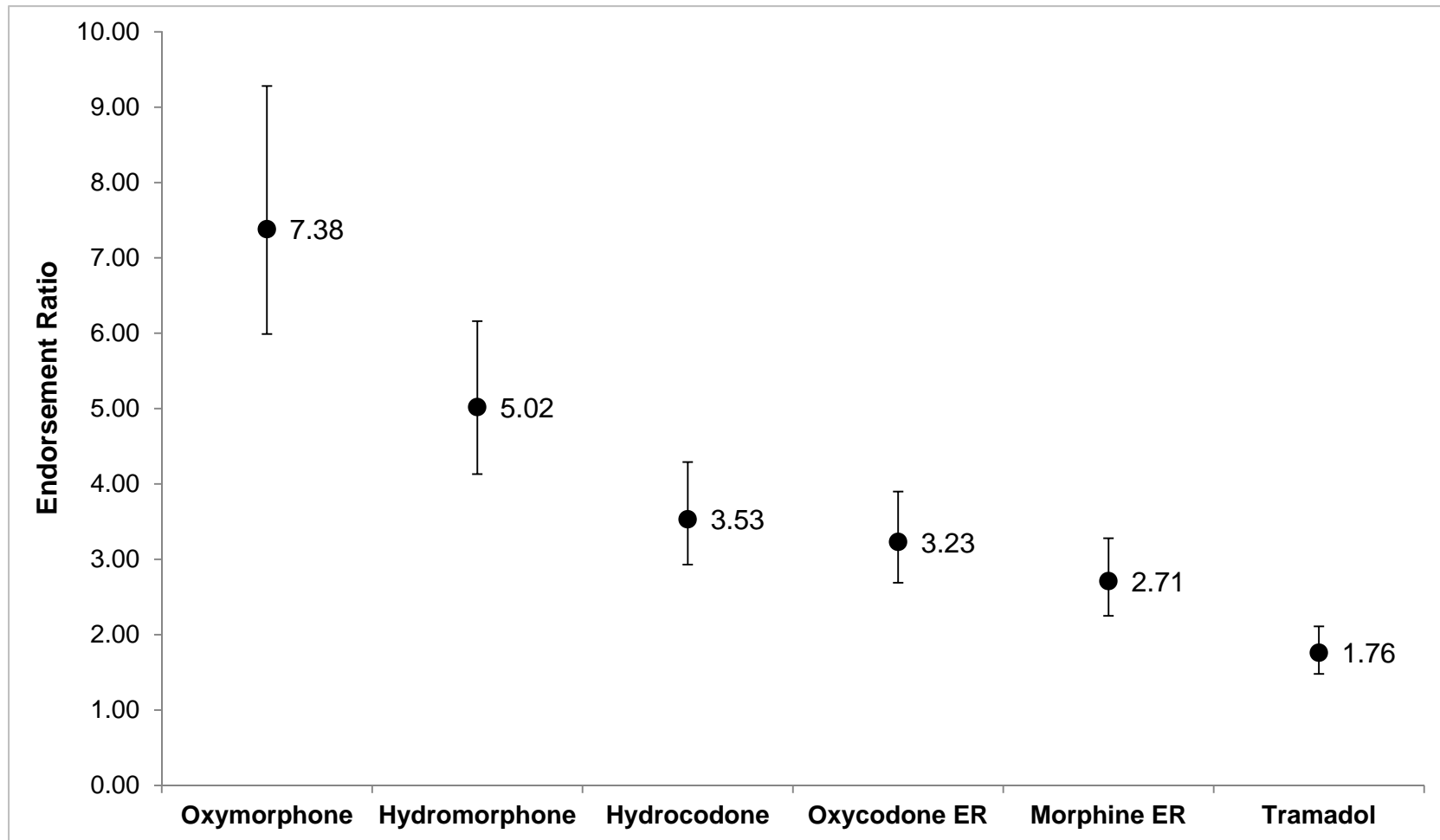
The Endorsement Ratio (ERo)

- ERo = probability of endorsing a drug / probability of discouraging that same drug^{1,2}
- *“the probability of endorsing drug A is x times the probability of discouraging drug A”.*
- ERo is a relative statistic and does not reflect the absolute difference between probability estimates.
- Examine ERo results alongside the predicted probabilities for sentiment categories.

¹ McNaughton EC, online endorsement of prescription opioids abuse: an integrative methodology. *Pharmacoepidemiology and Drug Safety*. DOI 10.1002/pds.3307

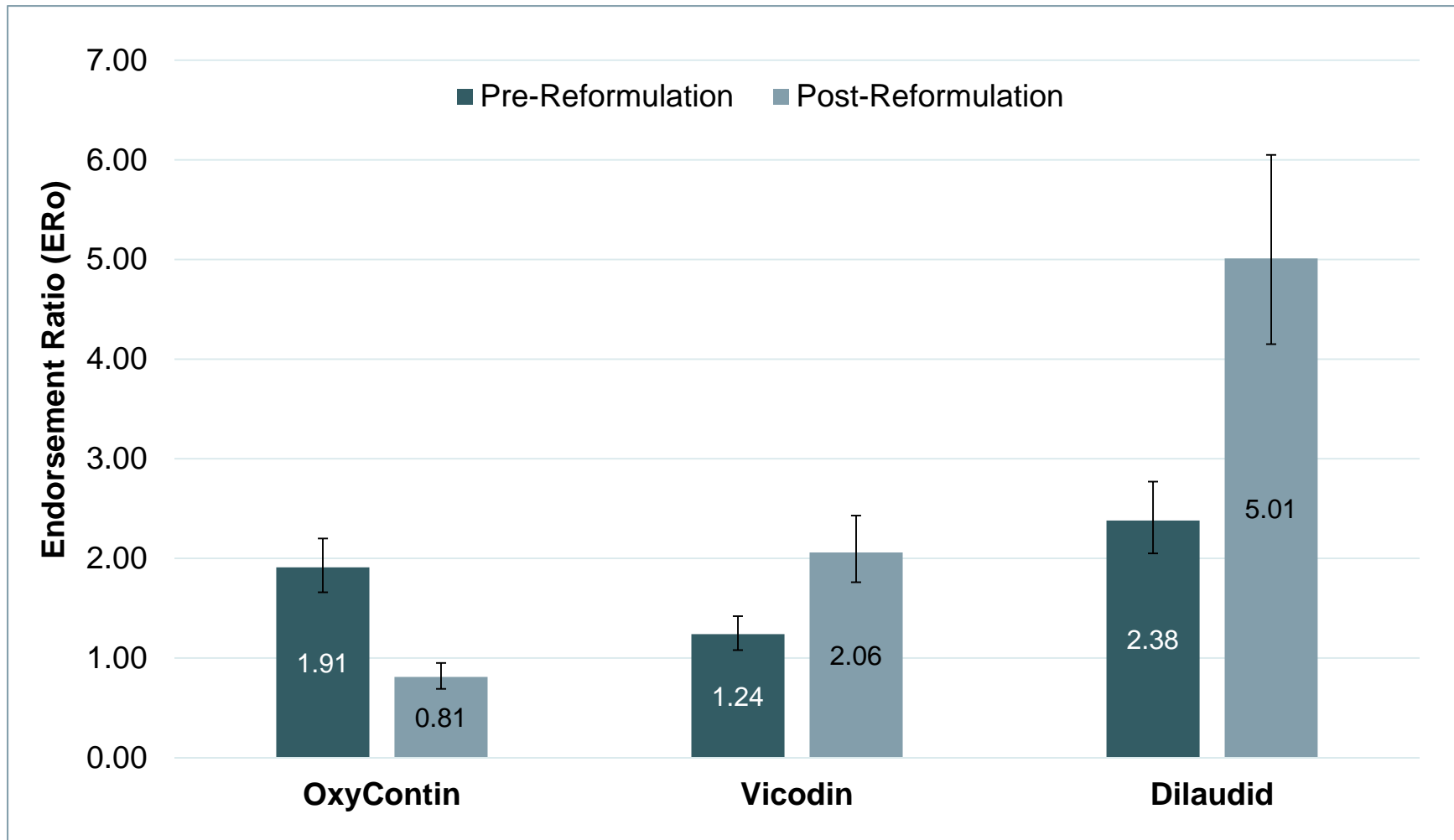
² McNaughton EC, Coplan PM, Black RA, Weber SE, Chilcoat HD, Butler SF. (2014). Monitoring of Internet Forums to Evaluate Reactions to the Introduction of Reformulated OxyContin to Deter Abuse. *Journal of Medical Internet Research*, 16(5):e119. DOI 10.2196/jmir.3397

Endorsement Ratio (ERo): Initial Methods Evaluation



McNaughton EC, Black RA, Zuleta MG, Budman SH, Butler SF. (2012). Measuring online endorsement of prescription opioids abuse: an integrative methodology. *Pharmacoepidemiology and Drug Safety*. DOI 10.1002/pds.3307

Endorsement Ratio: Assessing Abuse in a Changing Market



McNaughton EC, Coplan PM, Black RA, Weber SE, Chilcoat HD, Butler SF. (2014). Monitoring of Internet Forums to Evaluate Reactions to the Introduction of Reformulated OxyContin to Deter Abuse. *Journal of Medical Internet Research*, 16(5):e119. DOI 10.2196/jmir.3397

Drug Discussion: Recipe Tracking

What is a 'Recipe'?

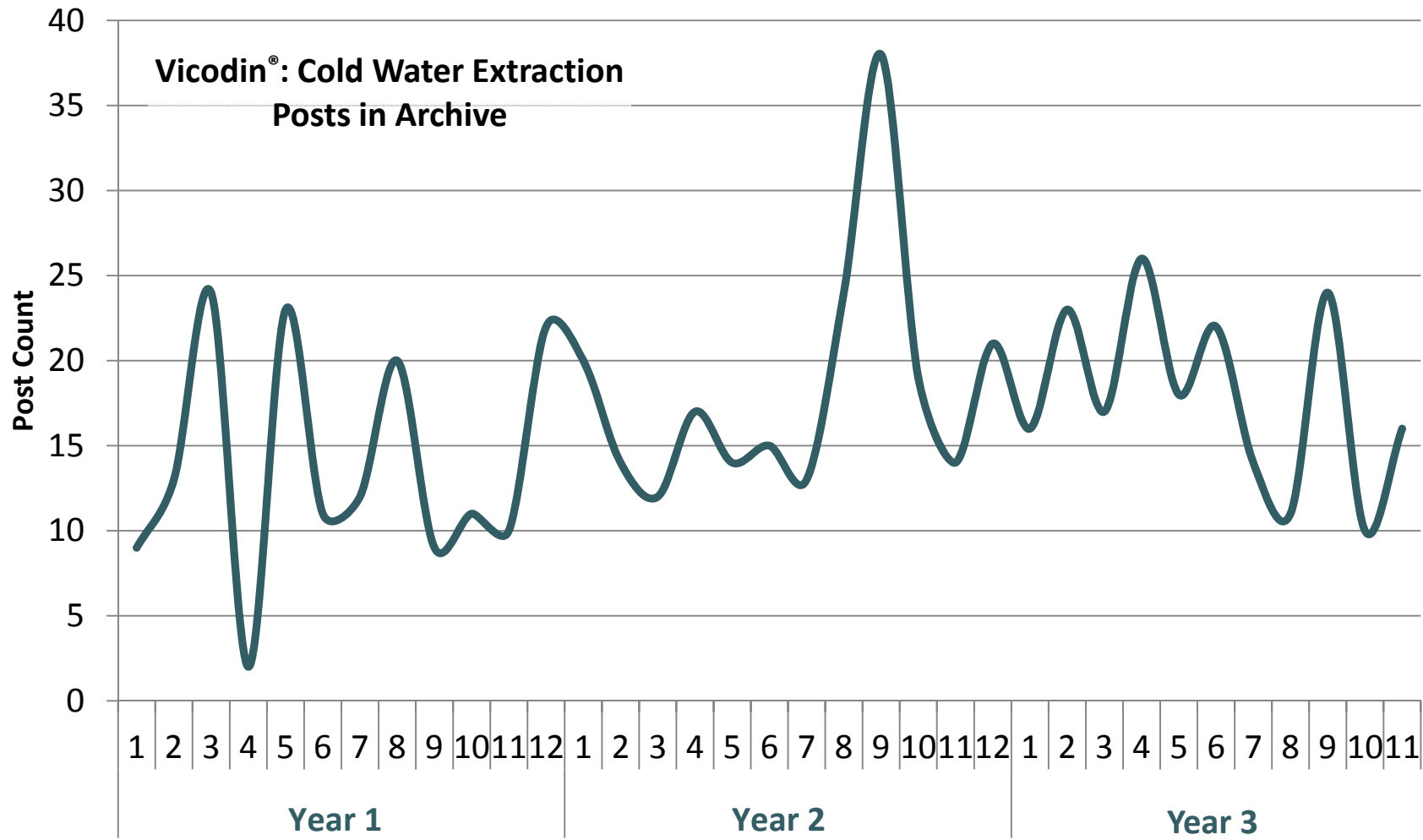
A process (physical, chemical or potentiation) that enables use of a product in a way other than as intended.

Fundamental steps used when manipulating a product.

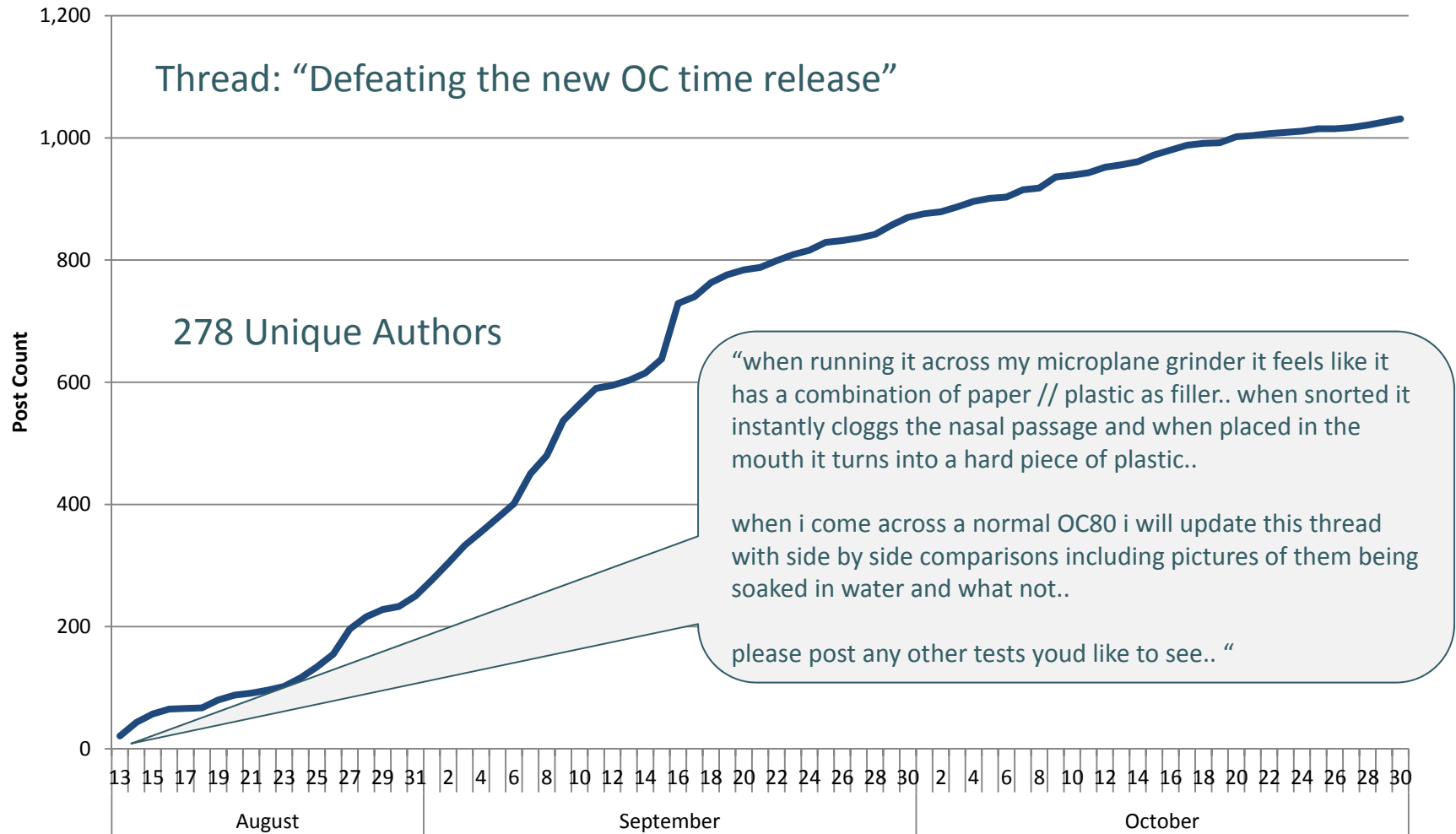
Recipes can be categorized into profiles such as:

- Product → Crush → Dissolve → Filter → Route of Administration (ROA)
- Product → Crush → Dissolve → ROA
- Product → Eat High Fat Meal → ROA

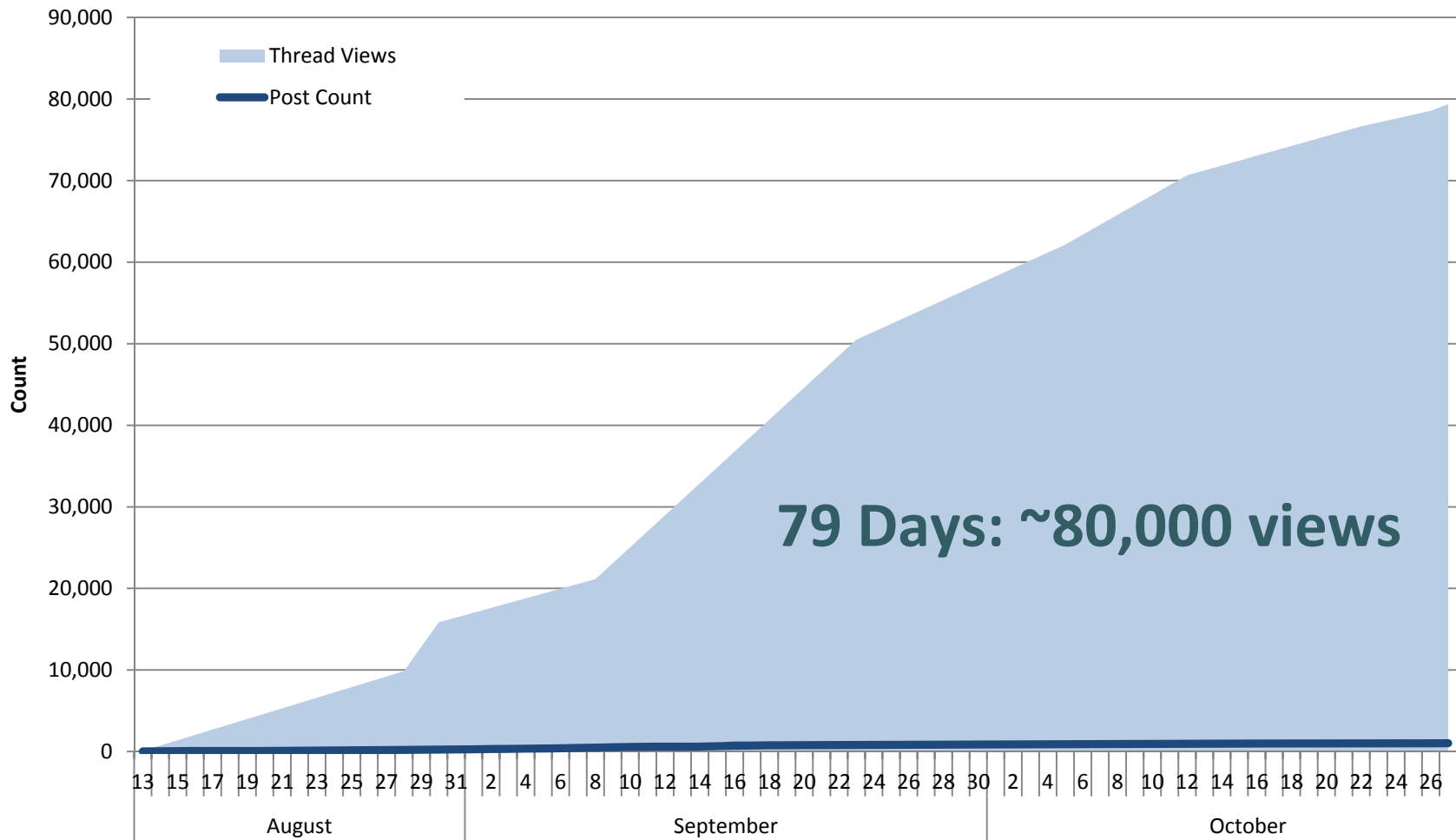
Recipe Example: Cold Water Extraction



Drug Discussion Forum Reaction to New OxyContin

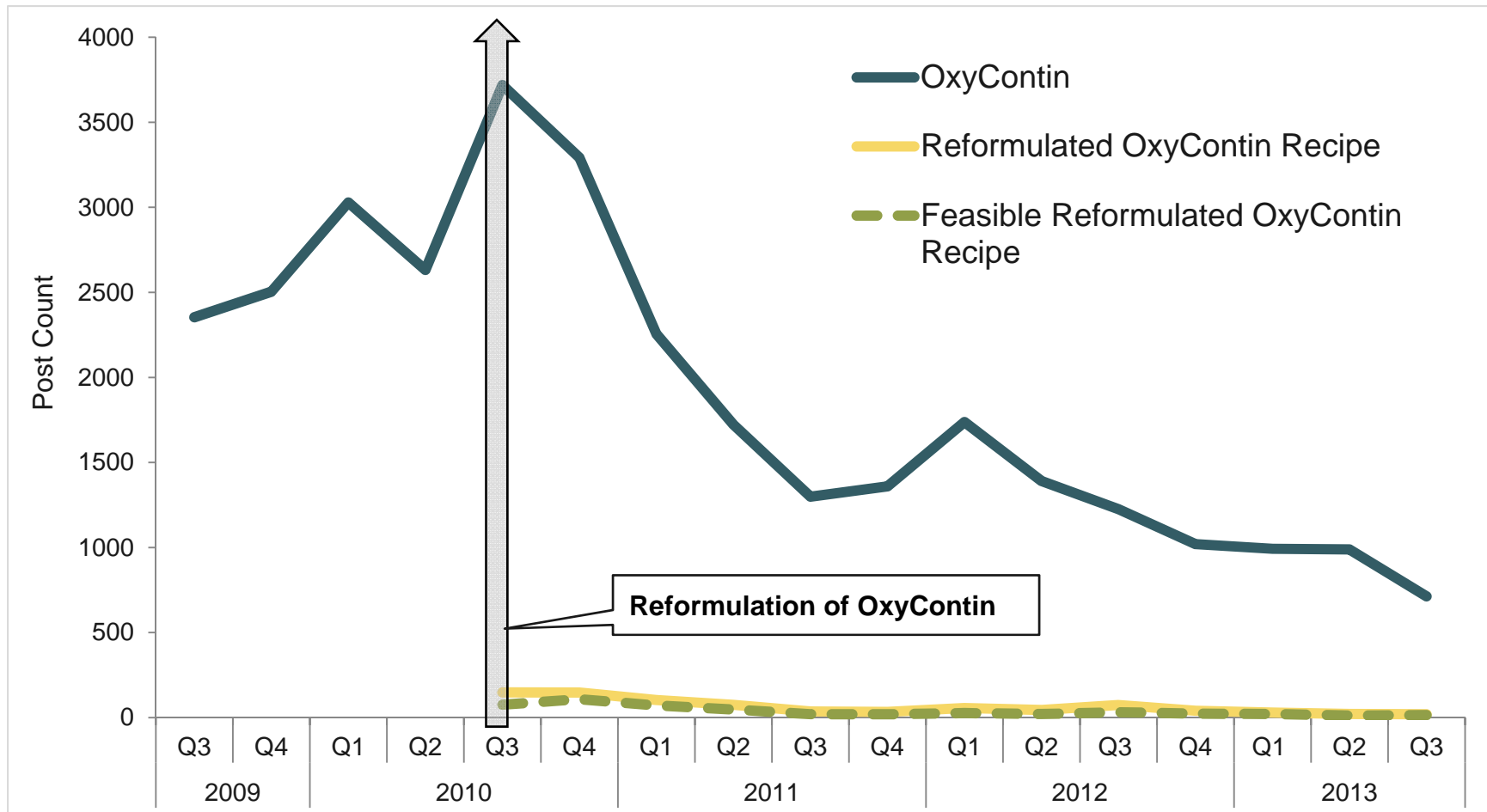


Drug Discussion Forum Reaction to New OxyContin



79 Days: ~80,000 views

Recipe Tracking for New Products



McNaughton EC, Coplan PM, Black RA, Weber SE, Chilcoat HD, Butler SF. (2014). Monitoring of Internet Forums to Evaluate Reactions to the Introduction of Reformulated OxyContin to Deter Abuse. *Journal of Medical Internet Research*, 16(5):e119. DOI 10.2196/jmir.3397

Recipe Tracking for New OxyContin

- Most discussed feasible recipes
 - 1. Crush/shave
 - 2. Dissolve/soak
 - 3. Chew
 - 4. Crush/shave, heat, and freeze
 - 5. Crush/shave and dissolve/soak
- Among feasible recipes, most discussed ROAs:
 - 52.2% oral use
 - 25.7% snort

McNaughton EC, Coplan PM, Black RA, Weber SE, Chilcoat HD, Butler SF. (2014). Monitoring of Internet Forums to Evaluate Reactions to the Introduction of Reformulated OxyContin to Deter Abuse. *Journal of Medical Internet Research*, 16(5):e119. DOI 10.2196/jmir.3397

Summary – Key Points

- Capable of detecting changes quickly
- Stable communities
- Influence beyond forum participants
- Helps place finding from other data streams in context
- Useful for evaluating the effect of national interventions
- Data can inform development of new technologies in drug formulations

Monitoring Drug Discussion Forums: Advantages for Assessing Abuse Potential

- Online forums provide a sentinel data source for abuse of prescription drugs
- Uncensored, peer-to-peer exchange of opinions and information
- Information can be aggregated from thousands of individuals at a relatively low cost
- Data may present leading edge indicators of new trends in prescription opioid abuse.
- Post-market experience data on many topics of interest for assessment of abuse potential:
 - Perceived desirability
 - Comparisons to other drugs
 - Methods of abuse

Acknowledgements

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