Prescription Rx Tweets?:
Advancing Knowledge on Digital Prescription Drug Abuse and Patient Safety

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WHO CC Launch
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Background: Emergence of Digital Health (eHealth)

• By end of 2014 ITU estimates that there will be 3 billion Internet users globally
• 72% of Internet Users in Pew survey looked for health information online within the last year. More than 1/3rd self-diagnose online.
• FDA survey identified 23% of adult Internet users purchased prescription drugs online
Example: Illicit Online Pharmacy

Common Characteristics

- Variety of drugs including lifestyle, essential, pain relief, weight loss, pet meds, etc.
- Extremely low pricing compared to legal sources and various sales specials
- FAQ does not require Rx for dispensing, “medical questionnaire” is taken at point-of-sale
- Multiple languages, worldwide coverage
Internet Pharmacy Ecosystem
Multiple Actors – Legitimate and Illegitimate

Possible Sources of Unapproved Medicines
- Unauthorized Manufacturer
- Criminal Networks

Other Service Providers
- Transport
- Payment

Marketing Sources
- Illicit online pharmacies
- Alibaba.com
- Affiliate sites, forums and other marketing sources

Online marketing is generally supported by ISPs, but components can also be provided directly to consumer by marketer’s own Internet infrastructure
Non-medical use of Prescription Drugs (NUPM)

- **Public Health Problem**: “Non-medical use” of prescription and OTC drugs among nation’s youth described as in decline, but remains public health priority in relation to substance abuse behavior.

- **Data Sources**: NUPM use and trends measured by nationally representative anonymous self-administered surveys (MFS)

- **Opportunity**: Augment data from traditional sources through social media surveillance. Twitter, though not the predominant social media used among teens, is estimated to be used by 1/3rd of this age demographic.
A New **Methodology** for Twitter Data Capture

- **High Volume and Stability**: Research team piloted a methodology to collect and analyze large volumes of Twitter data at relatively low cost. Data capture is comparable with buying data from third party Twitter content providers.

- **Open Source and Cloud**: Methodology combines open source software (R) and enterprise cloud computing services (Amazon) to create multiple computer instances all collecting data on different Twitter keywords.

- **Low Cost**: At a cost of approximately $150/month and with 99.95% uptime, we were able to collect over **15 million** tweets in a 3 month period. Purchasing the equivalent dataset from GNIP (Twitter provider) estimated at $22,500.
Main Results: Top-Line

- **Main Results:** 2.4 million Tweets analyzed using assisted supervised machine learning over 2 week period. 232,108 generic name and 1,786,626 “street names” (English.) 1.4% of tweets geocoded in each sample. 247 and 8,327 API limit notices.

- **NUPM Relevance:** Overall, generic instance had higher freq of relevant key terms (Valium #1, Adderall #3, Xanax #4.) Street had lots of noise and had to be cleaned further. 82% of generic tweets predicted as relevant, only 13% street tweets relevant.

- **Online Pharmacy Links:** Generic dataset had 59,845 hyperlinks with 5,039 unique URLs. 88.5% were tweeted at least 9 times. 75.7% of all hyperlinked tweets advertised sale of Valium by marketing affiliate that linked to an illicit online pharmacy. Total of 8,171 Twitter accounts tweeted or retweeted this link.
After filtering both instances for NUPM-relevant tweets, 1.36% (n=1842) and 3.1% (n=308) were detected as geocoded, in the generic name and street name instances, respectively, with most of the tweets originating from users in California, Texas, and New York. In a map comparing individual geolocatable tweets with zip code–level kernel density of individuals aged 15-19, there was a positive relationship observed between NUPM tweets and areas with higher youth density.
Examples: Individual User

RT @[ANONYMIZED]: "I wanna try xanax" Me
https://t.co/XpTERTzo6W6
Examples: Commercial (nutraceutical)
Examples: Online Pharmacy Promotion

Mark Thomas (@mark_thomas2014)

Buying Valium Online
costaparmacy.com/buy-valium/

RETTWEETS FAVORITES
2,475 492

2:29 AM - 2 Apr 2015

Reply to @mark_thomas2014

Trends
#NoIrishDealBecause Promoted by Secure America Now Rick Perry Drake #NeverForget
#DatassDiMe #Gogglebox #Mecca #Civic #AB533 Soyuz Antarctica

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Forensic Link:
Tweet (@mark_thomas2014) → Marketing Affiliate site (Barbados) → online pharmacy (Russia) categorized as rogue by LegitScript
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