Social listening for cardiac safety research
A Pilot Project

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Objective & Methodologies

Objective: Perform an exploratory pilot study on the potential utility (and “validity”) of social media as a new data source to support the assessment of drug-induced cardiac adverse events

◆ In-Scope parameters:
  • Time Frame: Information obtained between 01 Jan 2014 and 31 Dec 2015
  • Focused on two cardiac disease states and adverse events: atrial fibrillation and myocardial infarction
  • Posts from: Forums (HealthUnlocked, MedHelp, DailyStrength, HealingWell), Reddit, Twitter, Inspire

◆ Pilot study was divided into 3 parts in an attempt to address the following specific questions:
  • Validation of disease state (MI or Afib) mentioned…..
    How reasonable is it to assume that when a cardiac diagnosis is discussed in social media, it actually represents a patient with that diagnosis? Secondarily, how rich are the supporting data and level of detail for that diagnosis?
  • Validation of cardiac adverse events (MI or Afib) mentioned…..
    How reasonable is it to assume that when a cardiac diagnosis is discussed in social media, it actually represents a patient with that adverse event? Secondarily, how rich are the supporting data and level of detail for that AE?
  • Comparison to other data sources……..
    How does social media compare to what is contained in administrative claims and electronic health records?
12,659 posts manually curated

- An *in-scope diagnosis* of MI or Afib was discussed in 80% and 3% of the posts, respectively
- An *actual patient* for an in-scope diagnosis of MI or Afib was confirmed in 21% and 69% of the posts, respectively

*Note: All values are based on the number of confirmed patients per data source (i.e., the first column grouping)*
58 posts had MI or Afib as an AE
46 posts (23 for MI and 23 for Afib) provided the drug name
Expectedness was confirmed per the product USPI

Myocardial Infarction Mentioned as an Adverse Event
◆ Of the 23 posts mentioning MI as an AE with a drug, 7 different drugs were identified in which MI is not listed as an AE in the product USPI…. *7 events for further investigation*

- Drugs: ibrutinib, codeine, methadone, ranitidine, seroquel, meperidine, nivolumab
  - 1 post (Meperidine) stated medically confirmed (reporter: HCP) and life-threatening - *Twitter*
  - 1 post reported death with nivolumab - *Inspire*

Atrial Fibrillation Mentioned as an Adverse Event
◆ Of the 23 posts mentioning Afib as an AE with a drug, 4 different drugs were identified in which Afib is not listed as an AE in the product USPI…. *4 events for further investigation*

- Drugs: milnacipran, levothyroxine, Bacillus-Calmette-Guerin (BCG), modafinil
  - 3 posts mention Savella (milnacipran) but appear to be the same patient - *Twitter*
  - 3 posts mention Synthroid (levothyroxin) - *Inspire*
  - 1 post mentioned BCG - *Inspire*
  - 1 post mentioned modafinil - *Inspire*
43% (10/23) of AEs reported in social media for MI were associated with Adderall yet only 0.02% (62/248,008) of patients received Adderall prior to a diagnosis of MI in administrative claims data.

13% (3/23) of AEs reported in social media for Afib were associated with ibrutinib yet only 0.007% (2/27,486) of patients received ibrutinib prior to a diagnosis of Afib in administrative claims data.

Electronic Health Records

Of the 529,954 EHRs accessed, there was a 10 fold increase in Afib (11%) vs. MI (1.1%) cases which is in contrast to what is being discussed on social media – Afib (3%) vs. MI (80%).

Similar to administrative claims, very few patients were noted to have received Adderall (0.29%) prior to receiving Rx for MI and ibrutinib (0.002%) prior to receiving Rx for Afib.

Drug Tx discontinuation occurred in 0.56% of patients with Afib and 0.06% of patients with MI. Based on the reason(s) which can be selected for drug discontinuation, adverse reaction was selected for 5.1% of the patients on an Afib drug and 5.3% of the patients on a MI drug.
Lessons Learned & Potential Next Steps

Pilot Study Limitations
- Only 4.4% (12,659) of the posts identified from the search parameters were curated
- Time involved to manually curate posts were 92 total hours which is equivalent to 2.3 FTEs for 1 week
- Search terms used by Epidemico and Inspire were not identical to identify the posts

Pilot Study Findings
- 11 events for further investigation (Note: only 1 post stated medically confirmed by HCP)
- Lack of correlation between administrative claims (patient drug history receiving a diagnosis Tx ) vs. social media posts on drugs describing MI or Afib as an AE
- EHR database had a 10 fold increase in Afib vs. MI cases which is in contrast to what is being discussed on SM; ADR was not selected as a main reason for Afib and MI drug discontinuation

Questions around Lessons Learned & Potential Next Steps
- Should we have focused on investigating drugs used to treat the condition vs. medical and colloquial terminology used to describe the conditions?
- Were MI and Afib the most appropriate conditions selected for this pilot study?
- Should we have had access to the entire thread of each post to determine if more information could have been obtained since there is no way to follow-up for additional information?
- Should we have focused on more health/cardiac forums?
- Some challenges moving ahead: balancing the time to manually curate vs. an apparent paucity of information gained vs. potential value-added safety signals based on current knowledge of MAH from other established data sources such as spontaneous reports
Myocardial Infarction Specific Data

- Forums (N = 86)
- Twitter (N = 342)
- Reddit (N = 8,631)
- Inspire (N = 1,084)
- TOTAL N = 10,142
Social Media Findings

Atrial Fibrillation Specific Data

Forums (N = 231)
Twitter (N = 420)
Reddit (N = 9,097)
Inspire (N = 2,911)
TOTAL N = 416
Most Common Conditions Among Patients with Administrative Claims for MI and Afib

**Most Common Conditions Among patients with MI - Claims Data**

- Essential hypertension
- Angina pectoris
- Cardiac failure congestive
- Diabetes mellitus
- Electrocardiogram abnormal
- Angina unstable
- Myocardial ischaemia

**Most common Conditions Among Patients with AF - Claims Data**

- Essential hypertension
- Dyspnoea
- Chest pain
- Diabetes mellitus
- Arrhythmia
- Cardiac failure congestive
- Electrocardiogram abnormal
- Atrial flutter
Search Strategy Terms Used

**EPIDEMICO**
myocardial infarction: heart attack, heart attacks, infarction, myocardial infarction, heart stop, heart stopped, heart attack like symptoms, myocardial infarct, anterior mi, anteroseptal necrosis, anteroseptal infarction, inferior mi, myocardial reinfarction, necrotic cardiopathy
atrial fibrillation: atrial fibrillation, afib, a fib, atrial flutter, auricular fibrillation, arrhythmia absoluta, tachyarrhythmia absoluta

**INSPIRE**
A-fib, afib, atrial fib, atrial fibrillation, atrial flutter, palpitation, arrhythmia, irregular heart rate, heart galloping like a horse, heart racing, Myocardial infarction, myocardial infarct, heart attack, heart stop, heart stopped, heart stoppage, heart attack like symptoms, anterior MI, anteroseptal necrosis, anteroseptal infarction, inferior MI, chest angina, angina, chest burning, chest tightness, left arm pain, chest pounding, chest pain heart failure
EHRs: Reasons for Discontinuation of Tx

All Patients

MI Patients

Afib Patients

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