From the Bench to the Bedside: Cutting-Edge Big Data Initiatives in Pharma and Healthcare

Amy Affelt
SLA PHTD Spring Meeting
5 April 2016
Orlando, Florida
Twitter: @aainfopro
USING IT IS THE HARDEST PART.
It’s Just Data!

Traditional Data
• Rx prices over time
• Average Drug Development Costs
• Number of generic drugs prescribed v. brand name

Big Data
• Internet of Things (IoT)
• Adverse Effects Data
• Drug Therapy Durations/Mortality Rates
• Behavior Mashups
  – ER users/purchasing patterns
  – Diagnosed but non Rx compliant
WHY DID YOU SAMPLE MY DATA?
Formula v Algorithm

**Formula**
- Combination of inputs results in a calculation
- \(2 + 2 = 4\)

**Algorithm (“Where a Formula Stops Being a Formula”)**
- Combination of inputs results in a prediction or insight
- HealthMap.org
  - (social media mentions + blog posts + news reports + government agency data) – (filters for irrelevancy) = detection and tracking of disease outbreaks
Types of Big Data in Pharma

• Provider Data
  • Effectiveness of Rx on patients treated
• Insurance Data
  • Cost/Benefit Analyses
• IoT Data
• Government Data
  • FDA
  • CDC
• Disease-Specific Patient Registries
• Sales
  • $ or Units
Dangerous Doses: Data Mining for Deadly Drug Combinations

The Issue: 1 in 5 Americans take 3 or more drugs, 1 in 10 take 5 or more

• The Steps:
  • Looking for evidence where none is visible
    – Drugs with abnormal health rhythm as a side effect
  • FDA Adverse Drug Reactions Database
  • Electronic Health Records
    – Patients taking that drug, experiencing that side effect
      » What other drugs are they taking?
  • Cellular Testing
Cefazolin  Meperidine
Treats: bacterial infections  Treats: pain

FOR MEN:
Change in QT interval*
In milliseconds

<table>
<thead>
<tr>
<th></th>
<th>Percentage of patients with a QT interval of more than 500 milliseconds**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients taking one drug</td>
<td>14%</td>
</tr>
<tr>
<td>Patients taking both drugs</td>
<td>20%</td>
</tr>
<tr>
<td>Change in patients with long QT interval Percentage-point difference</td>
<td>+6</td>
</tr>
</tbody>
</table>

FOR WOMEN:
Change in QT interval*
In milliseconds

<table>
<thead>
<tr>
<th></th>
<th>Percentage of patients with a QT interval of more than 500 milliseconds**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients taking one drug</td>
<td>13%</td>
</tr>
<tr>
<td>Patients taking both drugs</td>
<td>25%</td>
</tr>
<tr>
<td>Change in patients with long QT interval Percentage-point difference</td>
<td>+12</td>
</tr>
</tbody>
</table>
User Friendly Visualization Tools

• Google Charts
  – https://developers.google.com/chart/

• Tableau

• Excel PivotCharts
  – https://support.office.com/en-us/Article/Create-a-PivotChart-c1b1e057-6990-4c38-b52b-8255538e7b1c
Internet of Things (IoT)

“The Patient Will See You Now”

- Google/Novartis Smart Contact Lens
- Aterica Veta Smart Case EpiPen
- Cancer Condition Management Apps
- Wrist sensors to monitor vitals
- Microchip-embedded pills
IoT Considerations

• Safety and Reliability of Devices
• Security Ramifications
• Patient Compliance
• Privacy Issues
• Doctor/Patient Communication Complications
“I’d Love To See The Data On That....”

• Drug Shortages

• Physician Malpractice Characteristics

• Hairdressers/Cancer/Respiratory Disease
Big Data Roles in Pharma for Info Pros

• Visualizations for Requested Data

• Report creation

• Algorithm Accountability Reviewer

• Alerts
  – Adverse effects in co drugs
  – News (industry and competing firms)
  – New Drug Developments (esp. from competitors)
  – New Big Data Initiatives
  – Proposed Legislation
  – Legal and Regulatory
http://books.infotoday.com/books/Accidental-Data-Scientist.shtml
“Pharma Bro” Martin Shkreli
Librarians Save Lives

- President Jimmy Carter
  - Melanoma/Brain cancer
  - Treated with “miracle drug” Keytruda from Merck
  - Cancer Free
Librarians Save Lives

Jamie-Lynn Sigler
Fighting MS for 15 Years
Tecfidera from Biogen

“Things are manageable now.”
Librarians Save Lives

Jessica and Emma Tierney
Childhood leukemia survivors
Tamiflu from Genentech
Thank You SLA PHT and Good Luck Out There!

Amy Affelt
aaffelt@compasslexecon.com
Follow me on Twitter: aaинфopro