



# From the Bench to the Bedside:



# Cutting-Edge Big Data Initiatives in Pharma and Healthcare

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Orlando, Florida  
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**USING IT  
IS THE HARDEST PART.**



**BIG  
DATA**

# 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?**



memegenerator.net

# 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

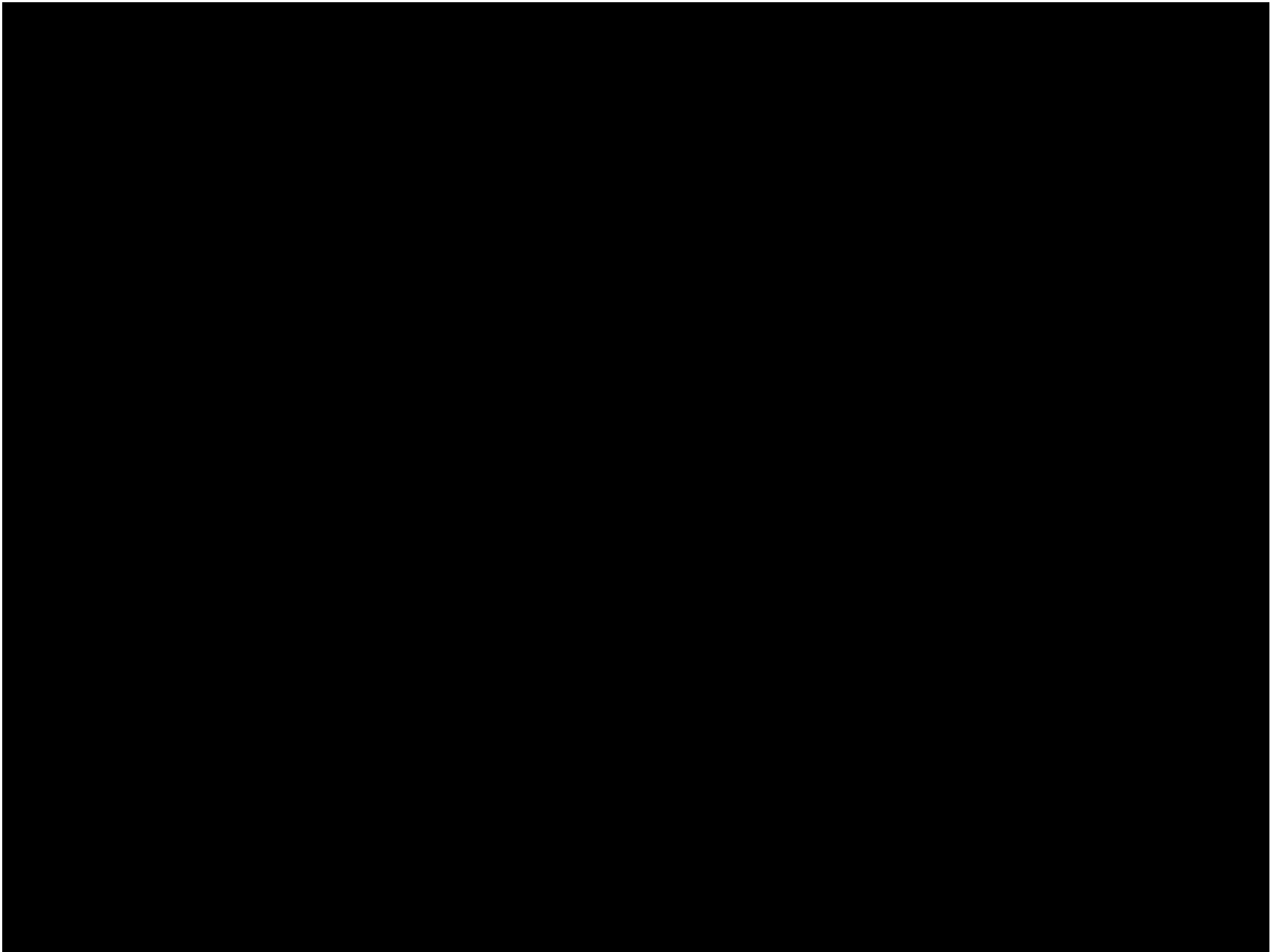


# Dangerous Doses: Data Mining for Deadly Drug Combinations

**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







<http://www.chicagotribune.com/business/ct-using-dig-data-to-uncover-prescription-drug-interactions-20160210-premiumvideo.html>

# Cefazolin    Meperidine

Treats: bacterial infections

Treats: pain

FOR MEN:

**Change in QT interval\***

*In milliseconds*

**+12**

**Percentage of patients with a QT interval of more than 500 milliseconds\*\***

*Patients taking one drug*



*Patients taking both drugs*



**Change in patients with long QT interval**

*Percentage-point difference*

**+6**

FOR WOMEN:

**Change in QT interval\***

*In milliseconds*

**+14**

**Percentage of patients with a QT interval of more than 500 milliseconds\*\***

*Patients taking one drug*



*Patients taking both drugs*



**Change in patients with long QT interval**

*Percentage-point difference*

**+12**

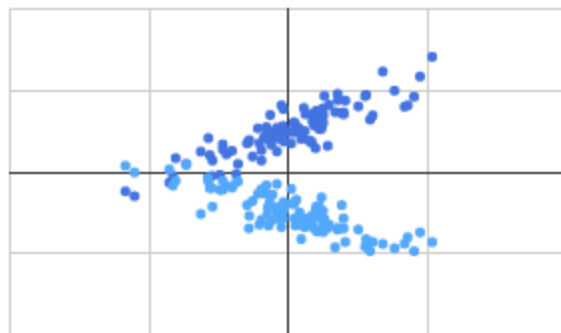
# User Friendly Visualization Tools

- Google Charts
  - <https://developers.google.com/chart/>
- Tableau
  - <http://get.tableau.com/trial/tableau-examples.html?cid=701600000005cS4&ls=Paid%20Search&lsd=Google%20AdWords%20%20Tableau%20-%20Free%20Trial&adgroup=Tableau%20%20Examples&kw=tableau%20examples&adused=92033937135&distribution=search&gclid=COftksqaoMsCFYeQHwodVS8Lvg>
- Excel PivotCharts
  - <https://support.office.com/en-us/Article/Create-a-PivotChart-c1b1e057-6990-4c38-b52b-8255538e7b1c>

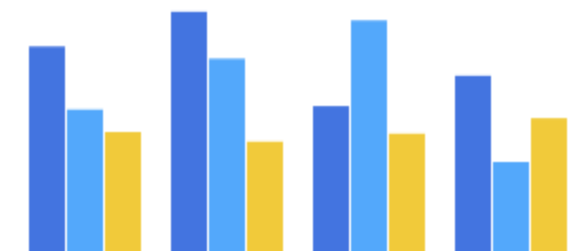
Geo Chart



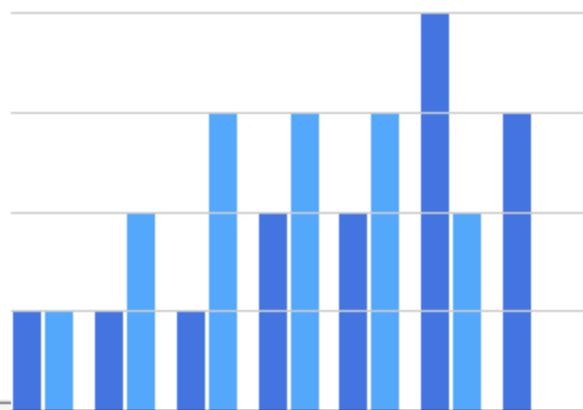
Scatter Chart



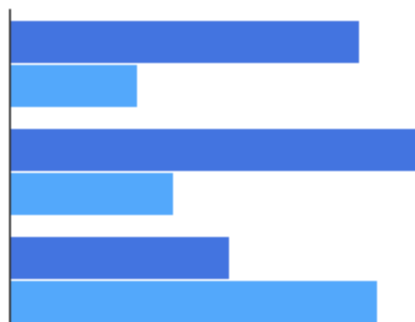
Column Chart



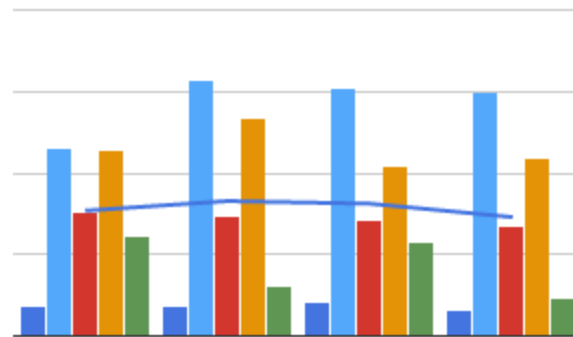
Histogram



Bar Chart



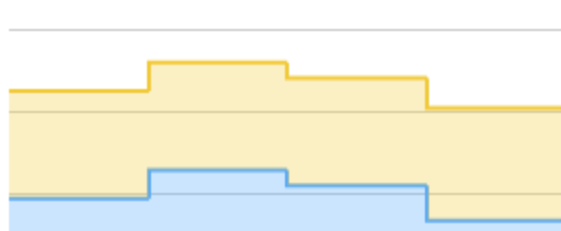
Combo Chart



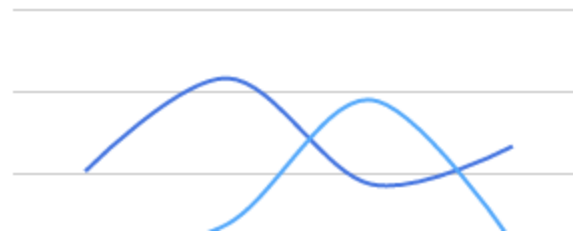
Area Chart



Stepped Area Chart



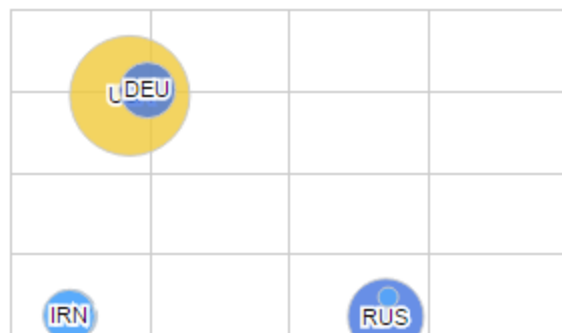
Line Chart



### Pie Chart



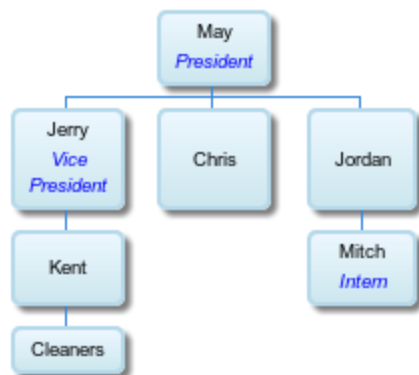
### Bubble Chart



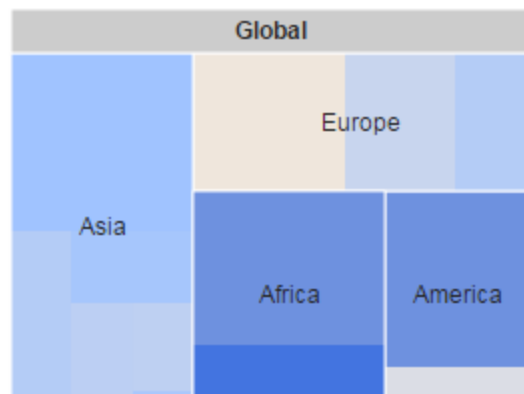
### Donut Chart



### Org Chart



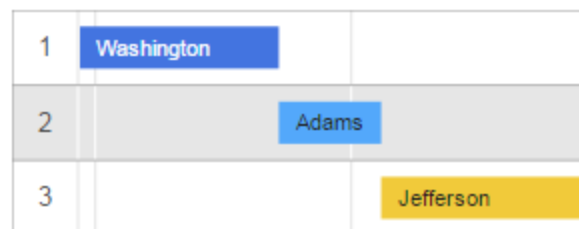
### Treemap



### Table

	Name	Salary	Full Time
1	Marie	\$24,700	✓
2	Albert	\$25,200	✗
3	Enrico	\$25,700	✓
4	Lise	\$26,600	✓

### Timeline



1800

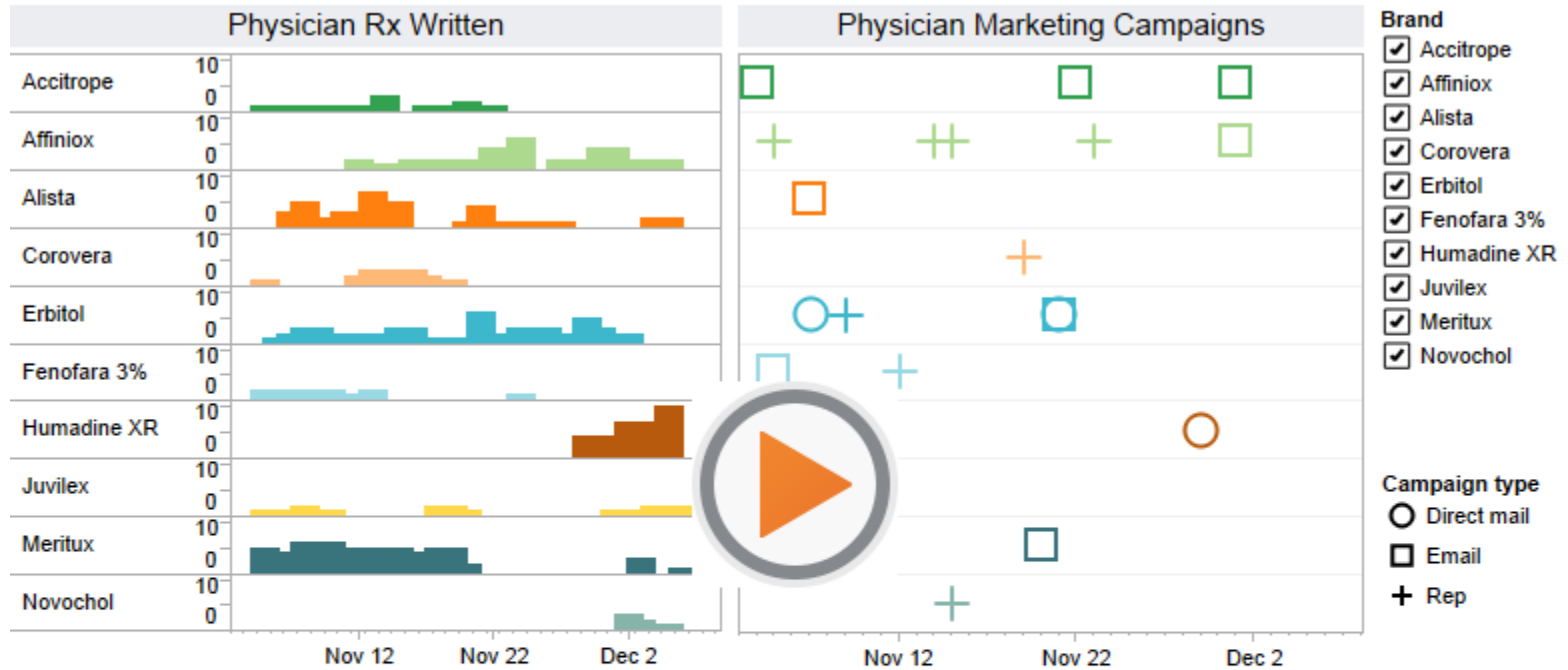
### Gauge



### Candlestick Chart



# Physician Marketing Tracker

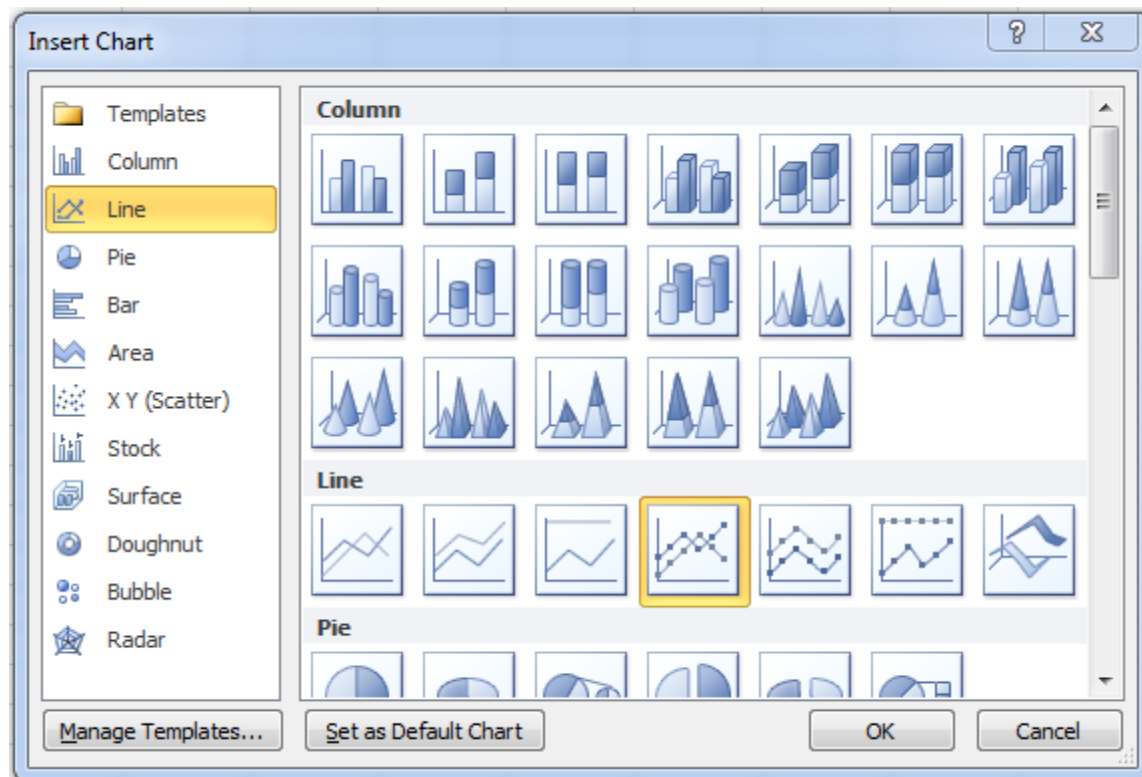
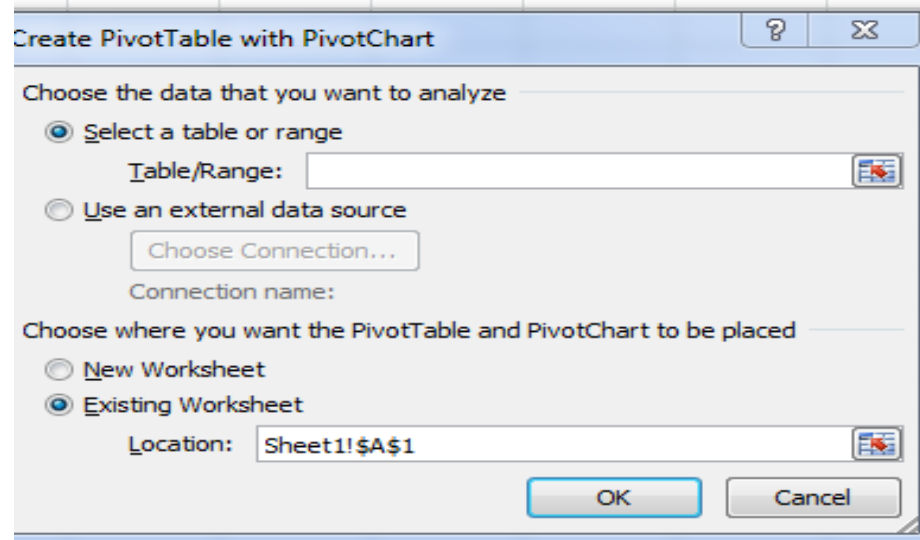


## Campaign Details

Campaign ID	Campaign type	Physician Name	Brand	Day of Campaign Date	# Rx written	Successful?
14C	Rep	Suzanna Pondel	Erbitol	November 9, 2012	16	No
17A	Direct mail	Jennifer Martinez	Erbitol	November 7, 2012	0	No
		Mark Mendel	Erbitol	November 21, 2012	12	No
	Email	Jack Han	Meritux	November 20, 2012	22	Yes
		Jason Vieh	Meritux	November 5, 2012	24	Yes
		Tamara Han	Meritux	November 20, 2012	31	Yes

### Successful?

- Yes
- No



# 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....”

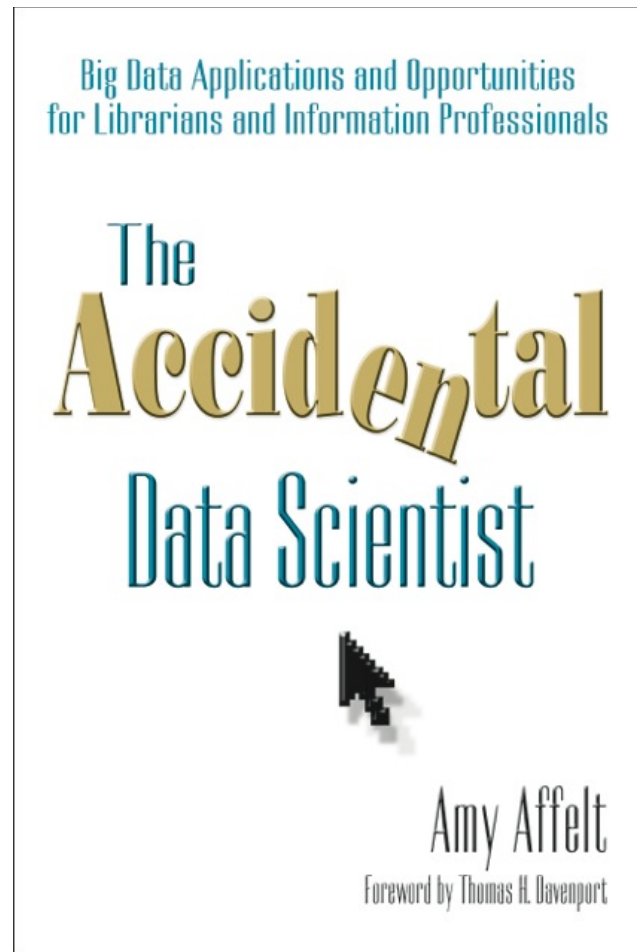
- Drug Shortages
- Physician Malpractice Characteristics
- Hairdressers/Cancer/Respiratory Disease



# 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



**THERE'S NO SUCH THING AS A LITTLE FLU**

A little cold is one thing. But the flu is a really big deal. Don't just treat the symptoms with over-the-counter medicines. Attack the flu virus at its source with prescription Tamiflu.

The flu comes on fast, so if you start feeling symptoms, call your doctor right away.

**Tamiflu**  
oseltamivir phosphate  
Prescription for Flu

Thank You SLA PHT and Good  
Luck Out There!



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