Visualizing the Patient Experience Using an Agile Framework
Session 173, March 7, 2018
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Today’s Presenter

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Conflict of Interest

Chris Mitchell

Has no real or apparent conflicts of interest to report.
Agenda

• Background
• Problem
• Solution
• Impact
• Questions
Learning Objectives

• Develop an extraction method and a database schema to store patient experience survey data

• Use an Agile development framework to formulate and deliver key metrics on a dashboard

• Apply sound data visualization principles to produce an effective, attractive and interactive patient experience dashboard

• Explain how the analytical potential of patient experience survey data by gaining access to disaggregated survey response data
What is It?

“The sum of all interactions, shaped by an organization’s culture, that influence patient perceptions across the continuum of care.”

• Patient Experience or Patient Satisfaction
  • Experience is objective
    • Did something occur, that should have occurred, and how often?
    • Always, sometimes, usually, never
  • Satisfaction is subjective
    • Were expectations met? Expectations change from patient to patient
    • Very good, very poor

How is it Measured?

• CAHPS (Consumer Assessment of Healthcare Providers and Systems) survey
  • Centers for Medicare and Medicaid Services (CMS) & Agency for Healthcare Research and Quality (AHRQ)
  • Hospital CAHPS (HCAHPS) first collected Oct. 2006, publicly reported Mar. 2008
  • Administered via phone, email, mail
  • More than 8,400 patients complete an HCAHPS survey each day
  • More than 30 certified CAHPS vendors in the U.S.

### HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems)

#### Key Concepts
- **21 Core** questions asked to discharged patients about their hospital stay
- **2 Global** questions
- **7 Composite (Domain)** measures, 2-3 questions each
- **2 Individual** questions
- **n**: The number of responses
- **Top Box**: Proportion of responses that were the best possible
- **Percentile Rank**: Percentage of peer group facilities at or below the Top Box score of your facility

#### Transition of Care
- I had a good understanding of the things I was responsible for in managing my health
  - \( n = 150, n(\text{strongly agree}) = 100 \)
  - Top Box Score: 100 / 150 = 67%
- Staff took my preferences into account
  - \( n = 140, n(\text{strongly agree}) = 122 \)
  - Top Box Score = 87%
- I understood the purpose of taking medications
  - \( n = 145, n(\text{strongly agree}) = 73 \)
  - Top Box Score: 73 / 145 = 50%
- **Transition of Care Top Box Score**: \( (.67 + .87 + .50) / 3 = 68\% \)

#### Source
Why is it Important?

- National standard for comparing patient perspectives in domains that matter to consumers and providers

  “The HCAHPS Survey is the first national, standardized, publicly reported survey of patients’ perspectives of hospital care…Until HCAHPS there were no common metrics and no national standards for collecting and publicly reporting information about patient experience of care”

- Incentivizes improvements in the quality of care
  - Inpatient Prospective Payment System (IPPS) – Payment Updates
  - Patient Protection and Affordable Care Act – Hospital Value-Based Purchasing Program

- Public reporting increases transparency and accountability
  - Hospital Compare Database / Star Ratings – CMS Hospital Quality Initiative
  - CAHPS Database / CAHPS Online Reporting Tool - AHRQ

Our mission is to provide excellence, innovation and superlative quality in the care of patients, the training of health professionals, and the creation and sharing of health knowledge within a culture that promotes equity, diversity and inclusiveness.

2017 – 2018 U.S. News & World Report “Best Hospitals” #1 in VA

6 Specialties Rated Among Top 50 Nationally

We Want Data!

• Dedicated Patient Experience Officer and staff sets institutional goals and responds to reporting requests using vendor-supplied online reporting tools

• High Volume
  • HCAHPS > 20,000 data points and 300 surveys / month
  • CGCAHPS > 300,000 data points and 2,600 surveys / month

• High Demand
  • Over 450 Health System locations reporting

• High Latency
  • Limited capability to repackage and slice responses by business units
  • Very little self-service
The Problem

Reporting and Analysis Limitations

• No actionable link to the patient encounter
• Decentralized analytics and reporting output … no single source of truth
• No granularity
• Comparative analysis difficult across business units, units, clinics
• No comparison to institutional goals
• Limited visualization capabilities
• Manual processing
• Growing issues and opportunities for improvement hard to identify
If you’re a consumer of patient satisfaction data, are you satisfied with vendor-supplied reporting solutions?

I’m satisfied with the reporting capabilities provided by the vendor

I’m not satisfied. I apply alternative means of reporting that aren’t offered by the vendor
This is What We Heard

“I just want to go to one place”

“Am I meeting my goals”

“How does my unit compare to others”

“I need my overall score quickly”

“How does my score rank”

“I want to see the details”

“How are my scores trending over time”

“I need to compare timeframes”

“Will I be able to print”

“The most efficient and effective method of conveying information to and within a development team is face-to-face conversation”

This is What We Saw

Service line comparison

Unit comparison

Unit Goal

Domain trends & resources
The best architectures, requirements, and designs emerge from self-organizing teams

Develop a Data Extraction Method

- Vendor sends encrypted XML files daily via Secure File Transfer Protocol (SFTP)

- Elements
  - **Patient Account Number** `<ITACCTNO>` (joins to EMR)
  - **Questions** `<QUESTION_MAP>`
    - Survey Type `<SERVICE>`
    - Question `<QUESTION_TEXT>`, `<VARNAME>`
  - **Responses** `<PATIENTLEVELDATA>`
    - `<CAHPS>`, `<ANALYSIS>`, `<DEMOGRAPHICS>`

```xml
<PATIENTLEVELDATA>
  <SURVEY_ID>1387919650</SURVEY_ID>
  <CLIENT_ID>2561</CLIENT_ID>
  <SERVICE>MD</SERVICE>
  <RECDATA>2017-12-11</RECDATA>
  <DISDATA>2017-07-17</DISDATA>
  <ANALYSIS>
    <RESPONSE>
      <VARNAME>A2</VARNAME>
      <VALUE>5</VALUE>
    </RESPONSE>
  </ANALYSIS>
  <QUESTION_MAP>
    <QUESTION>
      <SERVICE>MD</SERVICE>
      <VARNAME>A2</VARNAME>
      <QUESTION_TEXT>Courtesy of person who scheduled your appointment</QUESTION_TEXT>
    </QUESTION>
  </QUESTION_MAP>
</PATIENTLEVELDATA>
```
The Solution

Develop a Data Extraction Method

- Python script loops through SFTP directory daily
  - If date contained in XML filename >= today, parse the file
  - Builds pipe-delimited .csv Questions file from <QUESTION_MAP> element

```python
#Add all startDate, endDate, service ,varname, questionText tuples
for question in header.find('QUESTION_MAP').iter('QUESTION'):
    quesTup = (surveyQueueDate[0],
               surveyQueueDate[1],
               surveyCount,
               question.find('SERVICE').text,
               question.find('VARNAME').text,
               question.find('QUESTION_TEXT').text,
               dirPath)
    allQueueList.append(quesTup)
```

RECODE_DATE| "RECODE_END"| "SURVEY_COUNT"| "SERVICE"| "VARNAME"| "QUESTION_TEXT"
2013-07-01 | helpfulness of the person you spoke with before your procedure | "PG2561_20160217_2013-07-01"| "2016-02-09"| "94644"| "AS"| "A13"| "Waiting time before your surgery or procedure before your surgery or procedure began | "PG2561_20160217_2013-07-01"| "2016-02-09"| "94644"| "AS"| "A18"| "Ease of finding the surgery center" | "PG2561_20160217_2013-07-01"
The Solution

Develop a Data Extraction Method

• Builds pipe-delimited .csv Responses file from <PATIENTLEVELDATA> element

```python
# Do computation for the Response Table
for patient in root.iter('PATIENTLEVELDATA'):
    survey_id = patient.find('SURVEY_ID').text
    client_id = patient.find('CLIENT_ID').text
    service = patient.find('SERVICE').text
    recdate = patient.find('RECDATE').text
    disdate = patient.find('DISDATE').text

    for ans in patient.iter('HCAHPS'):
        ansTup = {
            'survey_id': survey_id,
            'client_id': client_id,
            'service': service,
            'recdate': recdate,
            'disdate': disdate,
            'HCAHPS': ans
        }
        ansTup.update(ans.find('VARNAME').text)
        ansTup.update(ans.find('VALUE').text)
        allRespList.append(ansTup)
```

$\text{SURVEY\_ID}|\text{CLIENT\_ID}|\text{SERVICE}|\text{RECDATE}|\text{DISDATE}|\text{RESP\_CAT}|\text{VARNAME}|\text{VALUE}$

| 1000645834 | "2561" | "MD" | "2015-10-14" | "2015-09-09" | "HCAHPS" | "ACO\_01" | "No" | "PG2561\_2016" |
| 1000645834 | "2561" | "MD" | "2015-10-14" | "2015-09-09" | "HCAHPS" | "ACO\_03" | "Yes" | "PG2561\_2016" |
| 1000645834 | "2561" | "MD" | "2015-10-14" | "2015-09-09" | "HCAHPS" | "ACO\_04" | "Yes" | "PG2561\_2016" |
Develop a Data Extraction Method

- Microsoft SQL Server Enterprise Data Warehouse
- SQL Server Integration Services (SSIS) package checks for parsed .csv files daily
- MERGE operation compares downloaded response and question data to warehouse
- Transformed into Star Schema
- Patient encounter details via account number join to Epic (EMR)
So We Have the Data, and a Team … Now What?

- Clearly Define Your Goals

- Fast, centralized access to survey results
- Unlimited drill-down and roll-up capabilities
- Enticing, interactive & effective visualizations
- Connection to the patient encounter
What are We Measuring?

- What matters most to your customers? ... Ask them!

Investigate

- Know your users
- Know what matters

Prioritize

- Stratify user groups
- Prioritize within stratum

Align Common Threads with Organizational Priorities to Find Key Metrics

- Status-Quo
- New Features
- Viability
Be Agile

- Identify product owner
- Scrum sprint planning and review
- Incremental delivery

- Deliver continuously
- Stay adaptable
- Fail fast, fail often

KANBOARD

PRODUCT BACKLOG

SPRINT BACKLOG

2 week sprint

develop
design
release

investigate and plan
Guiding Principles

**Build Trust**
- Become the source of truth

**Provide Visual Cues**
- Lead with questions

**Be Efficient**
- Achieve more with less

**Keep it Simple**
- Know your audience

**Empower the User**
- Provide tools to aid discovery

**Make it Scalable**

“Simplicity—the art of maximizing the amount of work not done—is essential”

The Solution

Visualizing the Output

• Self-Service Model
  • Leverages existing web-based data portal central to most UVA Health IT reporting services and scorecards
  • Integrated Tableau dashboard using JavaScript API
    • Architecture maintains organizational hierarchies
    • Authentication managed by Active Directory
    • Automated data extract refresh via `tabcmd` poke
  • Single source of truth
  • Over 600 users access the portal regularly generating thousands of views a day
The Solution

How do We Get to a Dashboard?

• Wireframe

• User Tests
  • Diversify
  • Be specific: “Where are you doing the best?”
  • Don’t lead the user

• Plan to fail
  • “They’re not gonna get it”
  • “I feel like this is backwards”
  • “I’m still confused”

Adapt and Iterate!
The Solution

Visualize the Output

Patient Experience

- Inpatient HCAHPS
- Outpatient CGCAHPS
- Emergency Department

- Service Line
  View and compare patient ratings and percentile rank by question domains for each Service Line

- Unit
  View and compare patient ratings and percentile rank by question domains for each Inpatient Unit

HCAHPS Go-Live
January, 2017

- Centralized Location
- Print Capability
- Customized Slicing
The Solution

☑ Overall Score
☑ Trending
☑ Goals

How do patients rate their Rate Provider 0-10 responses?
Displays top box scores for your clinic by date survey received. Top box scores are the highest ratings for all survey questions.

Primary Care: All Clinics

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## The Solution

### How satisfied were patients for each question on the survey?

Includes **top box** scores by unit for the specified timeframe. Select units and received date timeframe.

<table>
<thead>
<tr>
<th>Unit(s)</th>
<th>Timeframe</th>
<th>CCU (n: 14)</th>
<th>NNIC (n: 19)</th>
<th>OBS (n: 152)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(All)</td>
<td>Last 12 months</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Rate Hospital 0-10**
  - 71.4
  - 89.5
  - 68.3

- **Recommend The Hospital**
  - 78.6
  - 89.5
  - 79.2

- **Care Transitions**
  - Good understanding managing my health: 57.1
  - Hosp staff took pref into account: 64.3
  - Understood purpose of taking meds: 57.1
  - 59.5
  - 69.7
  - 64.3

- **Communication About Medicines**
  - Staff describe medicine side effect: 44.4
  - Tell you what new medicine was for: 70.0
  - 57.2
  - 77.8
  - 74.3

- **Communication with Doctors**
  - Doctors expl in way you understand: 71.4
  - Doctors listen carefully to you: 71.4
  - Doctors treat with courtesy/respect: 92.9
  - 78.6
  - 89.4
  - 87.2

- **Communication with Nurses**
  - Nurses expl in way you understand: 85.7
  - Nurses listen carefully to you: 92.9
  - Nurses treat with courtesy/respect: 92.9
  - 90.5
  - 84.2
  - 86.9

- **Percentile Ranks**
- **Timeframes**
- **Peer Comparison**
The Solution

How does my clinic's **Physician Communication Quality** performance compare to other clinics?

<table>
<thead>
<tr>
<th>Rank</th>
<th>Clinic</th>
<th>Top Box</th>
<th>%ile Rank</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Behavior Medicine at Orange</td>
<td>100.9</td>
<td>99</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Physical Medicine and Rehab at Pantops</td>
<td>98.8</td>
<td>98</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>UVA By Your Side Pediatrics at Crozet</td>
<td>97.3</td>
<td>93</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>University Physicians Charlottesville</td>
<td>96.0</td>
<td>95</td>
<td>1,190</td>
</tr>
<tr>
<td>5</td>
<td>UVA Endocrinology at Crozet</td>
<td>96.5</td>
<td>93</td>
<td>77</td>
</tr>
<tr>
<td>6</td>
<td>UVA Neurology at Crozet</td>
<td>95.8</td>
<td>95</td>
<td>58</td>
</tr>
<tr>
<td>7</td>
<td>Psychiatry in Family Medicine Clinic at Primary Care C...</td>
<td>97.0</td>
<td>95</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>University Physicians at JABA</td>
<td>96.8</td>
<td>95</td>
<td>199</td>
</tr>
<tr>
<td>9</td>
<td>Family Medicine - Crossroads</td>
<td>95.2</td>
<td>90</td>
<td>238</td>
</tr>
<tr>
<td>10</td>
<td>Colonnades Medical Associates</td>
<td>94.1</td>
<td>74</td>
<td>161</td>
</tr>
<tr>
<td>11</td>
<td>University Physicians at Orange</td>
<td>93.9</td>
<td>70</td>
<td>761</td>
</tr>
<tr>
<td>12</td>
<td>Family Medicine - Stony Creek</td>
<td>93.7</td>
<td>66</td>
<td>470</td>
</tr>
<tr>
<td>13</td>
<td>University Medical Associates</td>
<td>92.9</td>
<td>49</td>
<td>1,003</td>
</tr>
<tr>
<td>14</td>
<td>UVA Family Medicine and Specialty Care at Crozet</td>
<td>92.5</td>
<td>40</td>
<td>109</td>
</tr>
<tr>
<td>15</td>
<td>Family Medicine at Primary Care Center</td>
<td>92.5</td>
<td>40</td>
<td>718</td>
</tr>
<tr>
<td>16</td>
<td>Family Medicine at Pantops</td>
<td>90.3</td>
<td>18</td>
<td>132</td>
</tr>
<tr>
<td>17</td>
<td>Diabetes Education &amp; Management Program - Primary.</td>
<td>89.3</td>
<td>14</td>
<td>61</td>
</tr>
<tr>
<td>18</td>
<td>UVA Primary Care Clinic at Pantops</td>
<td>86.9</td>
<td>7</td>
<td>90</td>
</tr>
<tr>
<td>19</td>
<td>Cardiology at Orange</td>
<td>86.7</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>20</td>
<td>UVA Digestive Health at Crozet</td>
<td>85.5</td>
<td>4</td>
<td>73</td>
</tr>
<tr>
<td>21</td>
<td>Nephrology in University Physicians</td>
<td>83.7</td>
<td>3</td>
<td>68</td>
</tr>
<tr>
<td>22</td>
<td>P&amp;S Care Clinic at Pantops</td>
<td>80.4</td>
<td>1</td>
<td>133</td>
</tr>
</tbody>
</table>

**Cardiology at Orange**

**Physician Communication Quality**

- **Top Box:** 86.7%
- **Goal:** 94.0%
- **Percentile Rank:** 7%
- **Responses n:** 15

- ✔ Peer Comparison
- ✔ Percentile Ranks
- ✔ Timeframes
- ✔ Goal Performance
The Solution

- Peer Comparison
- Percentile Ranks
- Overall Score

How does my unit's overall hospital rating compare to others?
Units ranked by the Overall Hospital Rating percent of top box score. Select received date timeframe and number of responses.

- Timeframe: Last 12 months
- Number of responses required: 1

- < 30 responses should be interpreted with caution
- Between 30 and 50 responses can provide insight
- > 50 responses is likely to be representative of the population

Top Box %

Responses n

- 4CIV
- 4NIV/CVCU
- 7N OR (Cl.)
- NSIC (Cl.)
- 4CIV/Cl.
- 4M ICU
- 3M MMICU
- 8TM PCU
- 6CENTRAL
- 6EAST
- 6WEST
- 4CENTRAL
- 6EAST
- 3CENTRAL
- 8WEST
- 3EAST
- OBS
- SSU ED
- 8N OR
- SICU
- 3WEST
- CCU
- 8COB
- 7M ACUTE

≥ 75th Percentile
Between 50th and 75th Percentile
Below 50th Percentile
The Impact

Taking it Further

• Disaggregated survey data provides innumerable insights when joined to patients’ EMR

• In-house Business Intelligence team has deep knowledge of Epic data models and can add valuable dimensions to survey results

• Relatively short turnaround for complex requests

Case 1

• Department of Obstetrics and Gynecology requested a comparison of the “top-box” provider ratings from patients who had their baby delivered by a Certified Nurse Midwife (CNM) vs those who had their baby delivered by an Obstetrician

Case 2

• Invasive Cardiology physicians wanted to compare HCAHPS scores for Acute Myocardial Infarction patients who were treated surgically versus patients who were treated non-surgically with percutaneous coronary intervention
The Impact

It’s a Hit!

- Over 5,000 views of HCAHPS dashboard from over 100 different users in 2017
- ~ 200 hours saved in manual reporting time
- CGCAHPS (Outpatient) and Emergency Department dashboards expected in Q1 2018
Questions

• Chris Mitchell
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• Please remember to complete an online evaluation