Enterprise Intelligence Branch
Enterprise Intelligence Branch

... supports the MHS strategic goals through delivery of timely, relevant, and actionable information to all levels of the organization.

**Data Science Lab**
[Data Discovery / Research Section]
- MHS Health Statistics
- Data Discovery
- Epidemiologic Support
- Statistical Support
- Big Data Analytic Reports
- Data Science Tools / Sandbox
- Predictive Analytics
- Research
- De Identified Datasets

**Analytic Workbench**
[Analytics / BI Section]
- Operational Analytic Datasets
- Operational Analytic Reports
- Enterprise Measurement
- Enterprise Dashboards
- Enterprise BI Reporting
- Deep Dive Analysis
- Analytic Tools / Sandbox
- Self Service Business Intelligence

**Information Portal**
[Clinical Decision Support Section]
- Data & Information Web Services
- Data Driven Alerts and Recommendations
- Evidence Based Medicine Rules
- Risk Assessment and Management (ie. ACG, etc.)
- Population Health Assessment and Management
- CPG Adherence Analysis
Formula for Improvement

- Information
- Knowledge
- Insight
- Leadership
Information to Knowledge to Insight

EHR Claims VA Enrollment ...
Information to Knowledge to Insight

**Patient Safety Indicators**

**MHS Dashboard**

**Adjusted Clinical Groups (ACG) Resource Use Band Distributions**
Information to Knowledge to Insight

Measures
Analytics
Visual
Training
Registries
Alerts

ACG Academy Sessions

Kevin Ridderhoff Well worth the investment. Thanks for sharing your passion and allowing us to dream of providing better care to our deserving patients!

Unlike Reply you

Chris Armijo, M.Ed, MHA Having independently work on a retrospective cohort study comparing the ACG identification model against my hospital's identification method, I felt fairly confident with my working knowledge of the ACG model. After finishing this Academy, I realized I had barely scratched the surface of the ACG methodology. I'm excited to meet with the newly formed "ACG Academy working group" next week research projects. Thank you David Carnahan, MD, MSCE and Susan Chao.

Unlike Reply you
Information to Knowledge to Insight

Readmissions
Near Real Time Alerts
Operational Analytics

High risk criteria:
- Age \( \geq 60 \)
- Gagne \( \geq 5 \)
- RUB \( \geq 3 \)
- Chronic Condition Count \( \geq 3 \)

LEADERSHIP DASHBOARD

CASE MGMT READMISSIONS REGISTRY

PCMH READMISSIONS REGISTRY

Ensures f/U Appt is Given & Kept by HR Patients

Assigns Scarce Resources for HR Patients (i.e. Home Health Visit, Pharm Med Reconciliation)

Reviews Daily or Weekly Dashboard on f/U Rate for High Risk (HR) Patients

PATIENT ADMITTED

LCS

EDW
Information to Knowledge to Insight

Measures
Analytics
Visual
Training
Registries
Alerts

Leadership

No appt Appt Sch
Appt Kept

No appt Appt Sch
Not Kept Appt Sch Appt Kept

No appt Appt Sch

HR Admissions Registry

HR Admissions Registry

Admission
Discharge
30 Days After DC
## Comprehensive Patient Summary Report

### Patient Information
- **Name:** xxxxxxxxxxxxxxxxxxxxxxxx
- **DOB:** DD/MM/YYYY
- **Sex:** M/F
- **Phone:** xxx-xxxx-xxxx
- **Address:** DD, ST
- **City:** DD, ST
- **Next PCP:** xxxx
- **Last Visit:** xx/xx/xxxx
- **Last Admission:** xx/xx/xxxx
- **Hemoglobin AIC:** xx%
- **LDL:** xx%
- **HDL:** xx%
- **LDL/HDL Ratio:** xx
- **Glucose:** xx/xx/xxxx

### Prior Costs
- **Total Cost:** $xx,xxx,xxx
- **Rx Cost:** $xx,xxx
- **Resource Utilization Band:** x
- **Illness Burden Index (IBI):** xx

### Likelihood of Hospitalization
- **Hospital Dominant Morbidity Types:** x
- **Probability Hospital Admission (6 mos):** xx%
- **Probability ICU/GU Admission:** xx%
- **Probability Long-term Admission (22 + days):** xx%
- **Probability of Readmission:** xx%

### Utilization
- **Outpatient Visits:** xx
- **ER Visits:** xx
- **Inpatient Days:** xx
- **Admission Based on Referral:** xx

### Coordination of Care
- **Coordination Risk:** xx
- **Unique Providers Seen:** xx
- **Specialty Types Seen:** xx
- **Gastro Intestinal:** xx
- **Adverse Events:** xx

### Measures
- **Risk:** xx
- **Total Cost:** xx
- **Comorbidities:** xx
- **Acute LBP:** xx
- **Recurrence LBP:** xx

### Alerts
- **Surgical:** xx
- **Medical:** xx

### Coprimary Care Providers

### Immunizations
- **DTaP:** xx
- **NVDa:** xx
- **Influenza:** xx
- **Pneumococcal:** xx

### ACG Report Summary
- **Comprehensive Patient Summary Report:**

### All Names and Data are Made Up for Demo Purposes
**Opiates Management Registry / Patient Detail Dashboard / Reports**

<table>
<thead>
<tr>
<th>Last Drug Screening</th>
<th>MEDD Daily Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHANOL 11/08/2013</td>
<td>Description Score Date Covered From Date Covered To</td>
</tr>
<tr>
<td>10 ETHANOL</td>
<td>1260 11/07/2013 11/07/2013</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medications</th>
<th>Naloxone Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIAZEPAM (VALJUM EQ) -PO SMG TAB 06/20/2014 Direct POTS 5 MG 30</td>
<td>No items to display.</td>
</tr>
<tr>
<td>PERCOCET (OR SUB)-PO SMG TAB 09/20/2014 Direct POTS 5 MG-325MG 30</td>
<td></td>
</tr>
</tbody>
</table>

*All Names and Data are Made Up for Demo Purposes*
MHS Population Health Portal
MHSPHP ZBR Survey

If the MHSPHP were shut down, the operations of our MTF would be NEGATIVELY impacted.

- 408 responded in < 1 week (32% response rate)
  
  **75% Strongly Agreed**
  
  **15% Agreed**

- 150 comments

  **95% Comments Strongly Positive**
Spotlight #1:  
Wilford Hall Ambulatory Surgical Center

“We rely on the MHSPHP DAILY! The way it lists, sorts and filters the patient data is indispensable. We have our entire team using this database to track our patients. We have statistically improved our patient's care because of this oh-so-important tool. And the fact that it's constantly updating and improving only adds to its immense value. We can't live without it!”

<table>
<thead>
<tr>
<th>Acute Conditions [LBP, Pharyngitis, URI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2013: 3</td>
</tr>
<tr>
<td>Feb 2013: 3.3</td>
</tr>
<tr>
<td>Mar 2013: 3.3</td>
</tr>
<tr>
<td>Apr 2013: 3.6</td>
</tr>
<tr>
<td>May 2013: 9.5</td>
</tr>
<tr>
<td>Jun 2013: 8.7</td>
</tr>
<tr>
<td>Jul 2013: 8.7</td>
</tr>
<tr>
<td>Aug 2013: 9.4</td>
</tr>
<tr>
<td>Sep 2013: 8.7</td>
</tr>
<tr>
<td>Oct 2013: 8.9</td>
</tr>
<tr>
<td>Nov 2013: 9.2</td>
</tr>
<tr>
<td>Dec 2013: 9.4</td>
</tr>
<tr>
<td>Jan 2014: 8</td>
</tr>
<tr>
<td>Feb 2014: 8</td>
</tr>
<tr>
<td>Mar 2014: 8.2</td>
</tr>
<tr>
<td>Apr 2014: 8.2</td>
</tr>
<tr>
<td>May 2014: 8.2</td>
</tr>
<tr>
<td>Jun 2014: 8.6</td>
</tr>
<tr>
<td>Jul 2014: 9.8</td>
</tr>
<tr>
<td>Aug 2014: 10.2</td>
</tr>
<tr>
<td>Sep 2014: 10.1</td>
</tr>
<tr>
<td>Oct 2014: 10.5</td>
</tr>
<tr>
<td>Nov 2014: 10.5</td>
</tr>
<tr>
<td>Dec 2014: 10.4</td>
</tr>
<tr>
<td>Jan 2015: 10.3</td>
</tr>
<tr>
<td>Feb 2015: 10.4</td>
</tr>
<tr>
<td>Mar 2015: 10.3</td>
</tr>
<tr>
<td>Apr 2015: 10.6</td>
</tr>
<tr>
<td>May 2015: 10.2</td>
</tr>
<tr>
<td>Jun 2015: 10.3</td>
</tr>
<tr>
<td>Jul 2015: 10.3</td>
</tr>
<tr>
<td>Aug 2015: 10.3</td>
</tr>
<tr>
<td>Sep 2015: 10.4</td>
</tr>
<tr>
<td>Oct 2015: 10.7</td>
</tr>
<tr>
<td>Nov 2015: 11.1</td>
</tr>
<tr>
<td>Dec 2015: 11.2</td>
</tr>
<tr>
<td>Jan 2016: 14.4</td>
</tr>
<tr>
<td>Feb 2016: 14.4</td>
</tr>
<tr>
<td>Mar 2016: 14.2</td>
</tr>
<tr>
<td>Apr 2016: 14.3</td>
</tr>
</tbody>
</table>
Spotlight #2:
New England Naval Clinic

“Working with my command’s Population Health Coordinator, we were able to use the data and registries within MHSPHP to improve the Antidepressant Medication Management and Mental Health Follow-up metrics from below the 25th percentile to above the 90th percentile within a year. We used the MHSPHP to identify patients who failed to meet the metric and attempted to determine what could have been done differently. Using this information, we formulated a successful action plan to improve mental health outcomes. It would not have been possible to do this kind of deep-dive analysis without the high level functionality of MHSPHP.”

<table>
<thead>
<tr>
<th>Mental Health FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2013</td>
</tr>
<tr>
<td>Feb 2013</td>
</tr>
<tr>
<td>Mar 2013</td>
</tr>
<tr>
<td>Apr 2013</td>
</tr>
<tr>
<td>May 2013</td>
</tr>
<tr>
<td>Jun 2013</td>
</tr>
<tr>
<td>Jul 2013</td>
</tr>
<tr>
<td>Aug 2013</td>
</tr>
<tr>
<td>Sep 2013</td>
</tr>
<tr>
<td>Oct 2013</td>
</tr>
<tr>
<td>Nov 2013</td>
</tr>
<tr>
<td>Dec 2013</td>
</tr>
<tr>
<td>Jan 2014</td>
</tr>
<tr>
<td>Feb 2014</td>
</tr>
<tr>
<td>Mar 2014</td>
</tr>
<tr>
<td>Apr 2014</td>
</tr>
<tr>
<td>May 2014</td>
</tr>
<tr>
<td>Jun 2014</td>
</tr>
<tr>
<td>Jul 2014</td>
</tr>
<tr>
<td>Aug 2014</td>
</tr>
<tr>
<td>Sep 2014</td>
</tr>
<tr>
<td>Oct 2014</td>
</tr>
<tr>
<td>Nov 2014</td>
</tr>
<tr>
<td>Dec 2014</td>
</tr>
<tr>
<td>Jan 2015</td>
</tr>
<tr>
<td>Feb 2015</td>
</tr>
<tr>
<td>Mar 2015</td>
</tr>
<tr>
<td>Apr 2015</td>
</tr>
<tr>
<td>May 2015</td>
</tr>
<tr>
<td>Jun 2015</td>
</tr>
<tr>
<td>Jul 2015</td>
</tr>
<tr>
<td>Aug 2015</td>
</tr>
<tr>
<td>Sep 2015</td>
</tr>
<tr>
<td>Oct 2015</td>
</tr>
<tr>
<td>Nov 2015</td>
</tr>
<tr>
<td>Dec 2015</td>
</tr>
<tr>
<td>Jan 2016</td>
</tr>
<tr>
<td>Feb 2016</td>
</tr>
<tr>
<td>Mar 2016</td>
</tr>
<tr>
<td>Apr 2016</td>
</tr>
</tbody>
</table>
Spotlight #3: Guthrie Ambulatory Health Clinic

“Fort Drum's operations would definitely be negatively impacted. One of the key components of the patient centered medical home (PCMH) model is preventative health screenings. The MHSPHP streamlines the data in a way that makes the information readily available to the care team, cutting down the time searching through the patients medical record in order to find the data and most importantly ensures that we are providing our beneficiaries with the highest quality care possible ...”

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8</td>
<td>8.7</td>
<td>8.7</td>
<td>9</td>
<td>9.2</td>
<td>9.2</td>
<td>9.3</td>
<td>9.2</td>
<td>9.3</td>
<td>9.3</td>
<td>9.1</td>
<td>8.9</td>
</tr>
<tr>
<td>11.1</td>
<td>11.6</td>
<td>12.3</td>
<td>12.7</td>
<td>12.5</td>
<td>12.6</td>
<td>12.1</td>
<td>12.1</td>
<td>12.4</td>
<td>12.9</td>
<td>12.7</td>
<td>12.8</td>
</tr>
<tr>
<td>12.3</td>
<td>12.6</td>
<td>12.6</td>
<td>12.6</td>
<td>12.6</td>
<td>13.1</td>
<td>13.5</td>
<td>13.3</td>
<td>13.4</td>
<td>13.4</td>
<td>13.7</td>
<td>13.7</td>
</tr>
<tr>
<td>13.8</td>
<td>13.2</td>
<td>13</td>
<td>12.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Influenza Vaccination Rates

**Vaccination**

- Percent of children 6 months to 17 years who received an influenza vaccination during the past 12 months: 49.9%
- Percent of adults 18-49 years who received an influenza vaccination during the past 12 months: 31.2%
- Percent of adults 50-64 years who received an influenza vaccination during the past 12 months: 45.5%
- Percent of adults 65 years and over who received an influenza vaccination during the past 12 months: 70.0%

**Immunizations for San Antonio**

<table>
<thead>
<tr>
<th>Category</th>
<th>Vaccinated</th>
<th>Unvaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18</td>
<td>16442</td>
<td>19861</td>
</tr>
<tr>
<td>18 to 49</td>
<td>3665</td>
<td>17007</td>
</tr>
<tr>
<td>50 to 64</td>
<td>12588</td>
<td>13594</td>
</tr>
<tr>
<td>65+</td>
<td>7799</td>
<td>5088</td>
</tr>
</tbody>
</table>

(CDC Fast Stats)
Registry Flexibility

High Risk Conditions (PVX)
- Elderly >= 65
- Organ Transplant
- HIV
- Chronic Renal Failure
- Nephrotic Syndrome
- Leukemia
- Lymphoma
- Hodgkin Disease
- Multiple Myeloma
- Generalized Malignancy
- Asplenia
- Sickled Cell Disease
- Hemoglobinopathy

*Could you get this information in minutes if you asked for it? How long would it take to get this to the clinicians at point of care?*
Far left shows healthcare encounters incorporate clinical judgement by clinicians which becomes diagnostic codes (ICD10). These become morbidity groups (developed by Johns Hopkins) which ultimately groups people into similar morbidity buckets known as Adjusted Clinical Groups (or ACGs).

Morbidity Perspective

“Medically Ready Force...Ready Medical Force”
The RUB and IBI are aggregation bands where ACGs are grouped into either 5 distinct bands (healthy, low, moderate, high, or very high resource use) which amounts to the expected resource use in the coming year based on their comorbidity patterns, and the Illness Burden Index which amounts to the average cost of an individual in an ACG group in the past year compared to the average person in MHS.
In this slide, you see the Illness Burden Index—which shows the average cost of an individual in an ACG group climbs as one advances in age. Those who are 85 and older will use 5 times the resources of the average member in the MHS. This is to be expected. Additionally, as you see in both graphics—on the left by the intensity in the color and on the right by the size of the circles—the majority of our beneficiaries are aged 18–54 and are classified as RUB 3. On the right, the circle colors show the majority of the total cost for the MHS also align with the bulk of the people in RUB 3. This would be those rising risk patients I mentioned before. The interesting thing is the next most expensive groups are RUBs 4 and 5, which as you can see by the circle size are two of the smallest groups. This follows the Pareto principle which says majority of your costs can be attributed to a minority of your people. This would be the high risk folks we were talking about earlier.
ACG creates a coordination risk marker by using an algorithm of several other markers that are outlined here. You can see how a combination of these markers would help identify individuals who might be at significant risk for coordination issues—such as the person who has not seen their generalist in the past year, but has seen many other physicians to include a high number of specialists. The other factor labeled majority source of care really is a marker that gives an idea of how well one provider knows the patient. This would be the person who has seen the patient the majority of the time. If MSOC is lower than 29%, then there is a good chance no one really knows that patient.
Here is an example to help you see pragmatically who some of these markers are derived – on the left, we have a patient who has seen 5 specialists and no generalists. They have seen each specialist for one visit which means the majority source of care is 1/5 or 20%. As this example shows, it is unlikely any one of those providers know this patient extremely well given they have only had one encounter with them. The second example on the right is one where the patient has seen three unique providers, two of which are specialists, and one which is a generalist. Because the generalist has seen the patient 8 out of the 10 visits – the MSOC is a very high 80%, which means this patient likely is known extremely well and less likely to have coordination issues.

**Coordination Markers**

\[ S = \text{specialist} \]
\[ G = \text{generalist} \]

**Example 1:**
- 5 specialists seen
- 1 visit per specialist
- MSOC = 20%
- Specialty Count = 5
- Generalist Seen = No
- Unique Provider Count = 5

**Example 2:**
- 2 specialists seen
- 1 generalist seen
- 8 visits to generalist
- MSOC = 80%
- Specialty Count = 2
- Generalist Seen = Yes
- Unique Provider Count = 3
What about the 'so what' question? Why does it matter if the patient has a coordination issue? Why should I care? To begin with, Dr. Francis Peabody stated, "One of the essential qualities of the clinician is interest in humanity, for the secret of the care of the patient is in caring for the patient." The main reason is to help the patient. An additional reason is that it is costly to the healthcare system when we don’t do this well. Looking at those who were considered ‘Likely [have a] Coordination Issue’ … they had an average cost of 24,000 per member compared to those who were unlikely which had an average cost of 3,000 per member. When you break down the groups within these coordination risk categories – it is overwhelmingly the RUB 4’s and RUB 5’s that account for the majority of the cost. Once again, the high risk groups I mentioned before.
For those who are designated as ‘Likely Coordination Issue’ ... we found the following numbers in the MHS when comparing them to those who were ‘unlikely’ to have coordination issues: 6 times more adverse events (medications, procedural complications, toxins, etc.), 4 times more ER visits, 3 times more hospitalizations, and 8 times more expensive. If you were to have an opportunity to invest in something that gives you 8 times the profit – would you do it?

The Impact of Poor Coordination
I can hear some in the audience thinking – this is an old people problem – retirees mostly. The reality is – when you look at the data you find there are a significant number of our ADSM and their families that are at risk for coordination issues as I will show you in a couple of slides. When you break down the 'Likely Coordination Issue' group into beneficiary category – there are 89,000 ADSM and ADMFLY members. More than is found in the retired population. This is relevant to our mission.

Coordination Issues for Active Duty & Families

- 38,000 ADFMLY
- 51,000 ADSM
- 29,000 R-ADSM
- 34,000 RTFMLY
Care Coordination Demo

- How many Active Duty Service Members have been to the ER 5 or more times in the past year?
- How many ADSMs have been hospitalized 5 or more times in the past year?
- How many ADSMs have been diagnosed as having sleep problems?
- How many ADSMs are coming into the hospital/clinic TODAY with a previous diagnosis of depression?
- How many ADSMs do we suspect have coordination challenges?
Up Coming Attractions

- User Derived Tags
- Data Derived Tags
- Value Based Care Pathways (Navy)
Summary of MHSPHP Value

- Analytics platform
  - Predictive Analytics
  - Data Discovery at Population Level
  - Future SEMOSS implementation

- Point of Care Tool
  - PCMH Huddles
  - Case / Utilization Management
  - Disease/Pharmacy Management

- Reporting platform
  - New Tableau Reports
  - Individual Summary Reports
  - Future ‘Public’ Galleries

- Enterprise Capability
  - Scalable
  - Flexible
  - Responsive
Contact Information

Chief, Enterprise Intelligence

Chief, Analytics and BI