Thinking Outside The Margins: Data and Technology’s Role in Empowering Financial Success

RSM

HFMA REGION 9
Harvesting
Health & Hope
NEW ORLEANS

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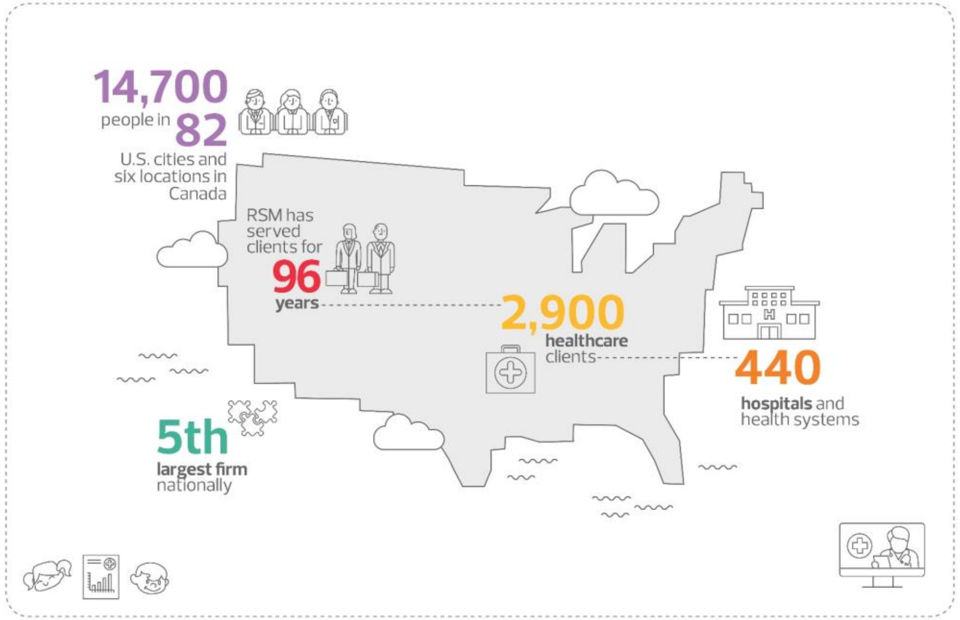
- PhD in computer science
- 34 years experience,
  15 years in health care analytics consulting
- 17 peer-reviewed research publications in leading health care conferences
- Millions of $ in ROI generated for health care clients

Jamie provides health care analytics for health systems to drive performance improvement in clinical quality, patient safety, operational efficiency and cost reduction.



DID YOU KNOW?

1st
RSM is the leading provider of audit, tax and consulting services to the middle market

$7.26B
RSM Global Revenues

4,700
RSM US Consulting Professionals

3,000+
Health Care organizations served domestically by RSM

5th
RSM is the fifth largest Global Audit, Tax, and Consulting Firm

51,000+
RSM Global Professionals

$135M
HC Industry US Revenue

OUR HEALTHCARE VERTICALS

- MERGERS AND ACQUISITIONS
- MARGIN IMPROVEMENT
- PAYMENT STRATEGY
- TECHNOLOGY & DIGITAL TRANSFORMATION
- ENTERPRISE, OPERATIONAL, & REGULATORY RISK
- CYBERSECURITY & DATA PRIVACY
- AUDIT, TAX, & TECHNICAL ACCOUNTING

RSM Health Care Data Analytics: Approach

- **Data-driven**
- Use data to choose opportunities
- **Augment not replace**
- Leverage EMR and existing data warehouses and solutions

- **No new silos**
- Clients have too many tools and too much data already
- **Time to Value**
- Short term ROI, Long term sustainability
- Solutions build on each other

MULTI-PHASED AGILE APPROACH

- ✓ Deliver short term return on investment
- ✓ Design data solutions which build a long-term foundation reusable for many analytics

LEVERAGE & AUGMENT EXISTING SOLUTIONS

- ✓ Utilize your data warehouse and business intelligence tools
- ✓ Leverage your EMR (Epic, Cerner, Meditech)

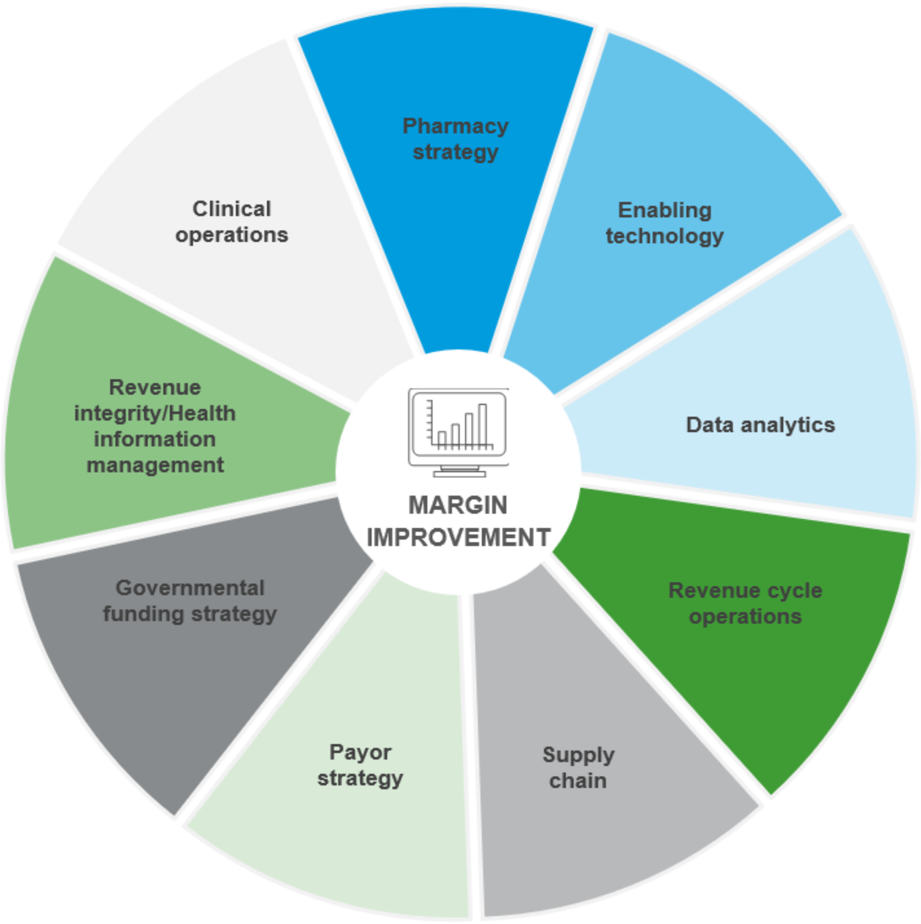
INTEGRATE SOURCES & ELIMINATE SILOS

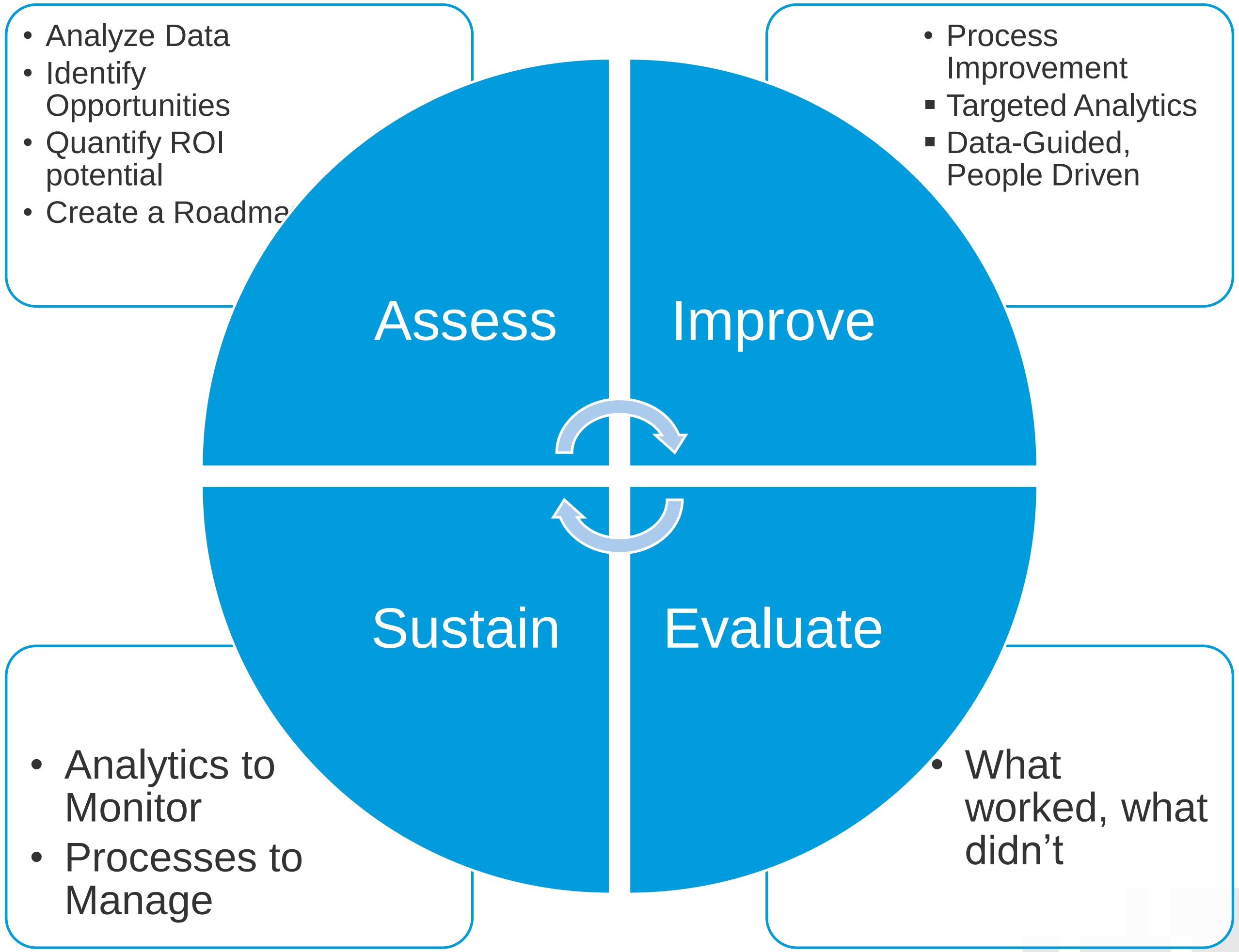
- ✓ Join EMR data with other sources such as patient experience, cost, registries
- ✓ Create a single version of the truth, an enterprise analytics data source

PROVIDE INTUITIVE & INTERACTIVE VISUALIZATIONS

- ✓ Consistent look and feel
- ✓ Reduce learning curve

Data-guided Performance Improvement





Increasing Margin

- Increase Revenue
  - ➢Do More
    - Marketing Analytics ▪ Surgical Analytics ▪ Care Gaps ▪ Capacity Management ▪ Referrals Management
  - ➢Capture More Revenue
    - ▪ Registration/Verification ▪ Clinical Documentation ▪ Denials ▪ Accounts Receivable
    - ▪ Pricing Analytics ▪ Case Level Optimization
- Reduce Cost
  - ▪ Reduce LOS ▪ Optimize Staffing ▪ Manage Utilization ▪ Reduce avoidable ED visits
  - ▪ Supply Chain ▪ Automation ▪ Reduce Clinical Variation ▪ Tool Rationalization and Consolidation
- Be More Efficient
  - ▪ Patient Movement ▪ Scheduling ▪ Productivity ▪ Surgical Efficiency ▪ Automation
- Do Better
  - ▪ Reduce Complications ▪ Readmissions ▪ Mortality ▪ Patient Experience

Agenda

Increasing Revenue

- Market Analytics
- Surgical Analytics
- Revenue Cycle Analytics
- Care Gaps

Reducing Cost

- Efficiency and Patient Movement
- Reducing Length of Stay
- Care Paths
- Clinical Effectiveness/ Clinical Variation
- Tool Rationalization

Doing Better

- Patient Experience

Getting Started

- Assessments
- Contact Info

MARKET ANALYTICS

Marketing Analytics

- What providers should I hire? Or collaborate with?
- Should I build an ambulatory surgical center?
- Which services should I offer in which locations?
- Where should I invest? Should I buy an orthopedic surgery group?

To answer these types of questions, we leverage claims data

➢ For patients in my geography who go to other health systems, what specialists are they seeing? What procedures?

➢ When my doctors refer to other providers, what specialists do they refer to?

➢ How many orthopedic surgeries are performed in my area? What ancillary services are received?

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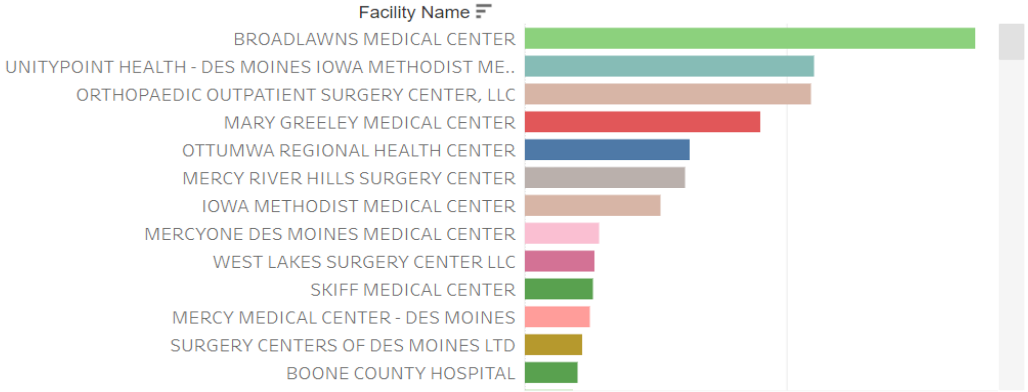
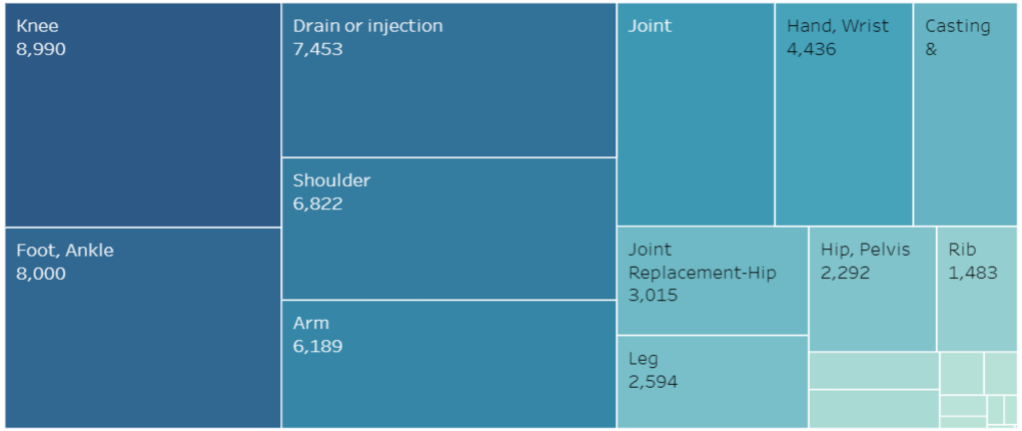
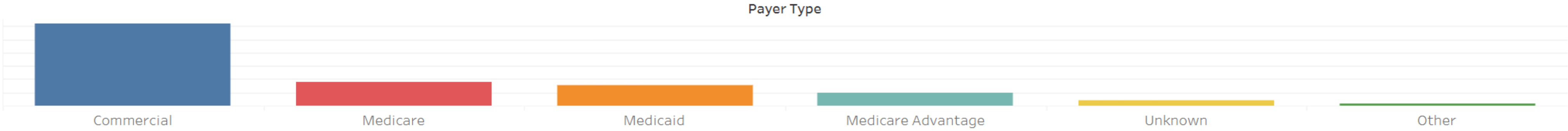
SHOW FILTERS & PARAMETERS







Payer Type	Payer Name	
Commercial	BCBS IOWA (WELLMARK)	12,728
	BC/BS OF IOWA - WELLMARK	9,370
	UNITED HEALTHCARE	5,362
	UNITED HEALTH CARE	3,358
	IOWA TOTAL CARE	2,822
	UMR	1,983
	AETNA	1,742
	UHC HMO 87726	1,697
	MEDICA	1,307
	WELLMARK IP OP	1,178
	HEALTH PARTNERS - MINNESOTA	1,070

Procedure Service Line	
Orthopedics	$600,071,270
DME & Supplies	$81,560,270
Radiology	$40,880,834
Neurosurgery	$33,355,823
Physical Rehabilitation	$18,272,000
Evaluation & Management	$12,190,926
General Surgery	$6,435,565
Drugs	$3,460,479
Hospital Observation	$2,925,462
Hospital Inpatient	$2,711,517
Emergency Department	$1,685,788

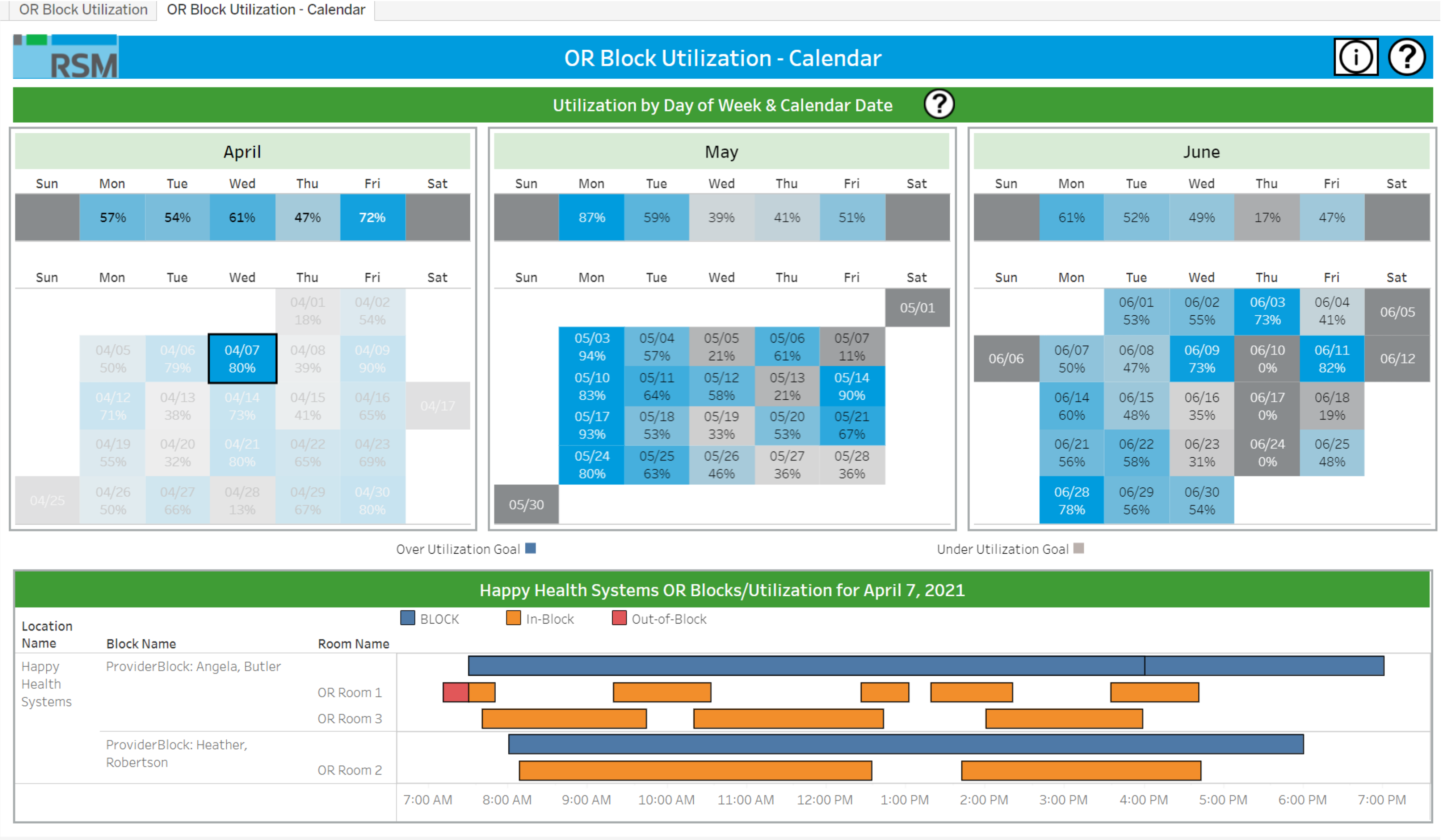
Surgical Analytics

Case Study:
Operating Room Utilization

PROBLEM	GOAL	APPROACH	RESULTS
Operating rooms are sometimes empty and sometimes overbooked and open after hours. Some surgeons do not have enough operating room time available and others need more time. Disruption from COVID-19 has magnified these issues	Increase the amount of the operating room is full and decrease the amount of time the operating room is staffed and empty. Optimize block allocations to the changing needs of surgeon groups.	1. Track room utilization by hour to optimized staffed hours and volume. 2. Analyze anesthesia usage and out-of-room staff utilization across surgical and procedural suites to monitor resource constraints. 3. Analyze service and surgeon block utilization, including: block utilization, block releases, overbooks, unblocked utilization, scheduling patterns	• 12% higher service block utilization • 29% fewer empty staffed rooms • 25% lower out of block minutes

Can also be applied to:
- Endoscopy
- Cath Lab
- Electrophysiology
- Interventional Radiology
- Complex Imaging

DEMO



OR Block Utilization
OR Block Utilization - Calendar
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OR Block Utilization - Calendar
Utilization by Day of Week & Calendar Date
April
May
June
Sun Mon Tue Wed Thu Fri Sat
57% 54% 61% 47% 72%
87% 59% 39% 41% 51%
61% 52% 49% 17% 47%
Over Utilization Goal
Under Utilization Goal
Happy Health Systems OR Blocks/Utilization for April 7, 2021
BLOCK
In-Block
Out-of-Block
Location Name
Block Name
Room Name
Happy Health Systems
ProviderBlock: Angela, Butler
OR Room 1
OR Room 3
ProviderBlock: Heather, Robertson
OR Room 2
7:00 AM 8:00 AM 9:00 AM 10:00 AM 11:00 AM 12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM 6:00 PM 7:00 PM

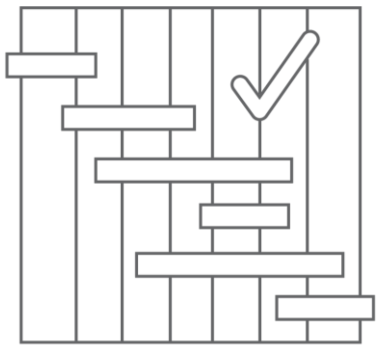
Surgical Efficiency

The perioperative suite is one of the busiest areas of the hospital, generates the most revenue and incurs the highest costs. Therefore, throughput and efficiency are vitally important.

SOME OF THE IMPORTANT KPIS TO TRACK EFFICIENCY INCLUDE:

- ✓ On-time starts
- ✓ Cancellations
- ✓ Add-ons
- ✓ Turnover and turnaround times
- ✓ PACU boarding times
- ✓ Case duration accuracy

Through analytics we can monitor the efficiency and also looks for causes of inefficiencies.



REVENUE CYCLE ANALYTICS

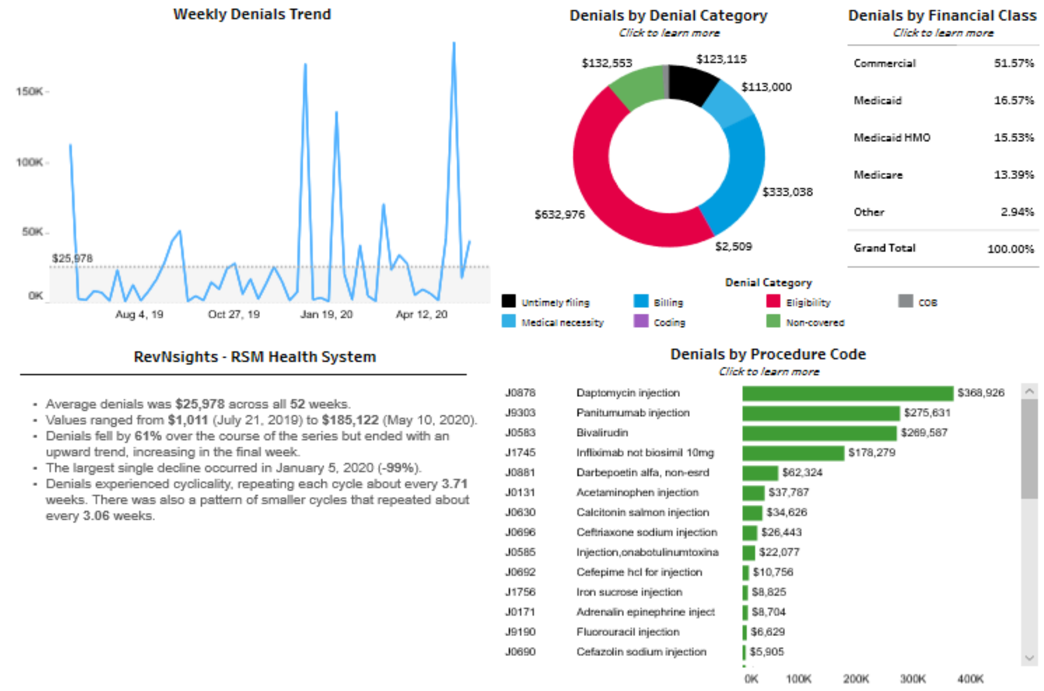
RevNsight Denial Analytics

Improving the denial success rate throughout your health care organization's revenue cycle

Quickly determine root causes of denials with our customized solution tailored to your needs

Whether your organization is facing challenges in regards to poor denial reporting, outdated denial processes - or you are looking to **recoup lost revenue and maximize reimbursements** - RSM can help improve your denial success rate throughout your revenue cycle utilizing our interactive denial application. We drive a tailored and customized solution allowing you to quickly and easily determine root causes of denials.

DASHBOARD EXAMPLE



OUR APPROACH

- Out of the box deployment using your 835 ERAs
- Quick deployment, usually in a matter of 3-4 weeks
- Drill down capability to the line item denial level
- Ability to spot trends in denials and navigate to accounts currently denied in your AR
- Provide weekly support to update, validate and publish the dashboards

OUR INTERACTIVE DENIAL APPLICATION CAPABILITIES

Our interactive 835 application allows you to quickly and easily determine the cause(s) of denials and compliments the ability to monitor overturned denials.

Questions we can answer:

✓ Top procedure issues
✓ Payer issues
✓ Provider issues
✓ Facility/Clinic issues
✓ Hospital vs. Physician issues
✓ Front, middle and back revenue cycle issues

- REVNSIGHTS
- Our RevNsights empower your end users to understand your data through stories.
- Tailored stories to your end users
- Quickly understand what data is most important
- Easily add stories to your dashboards

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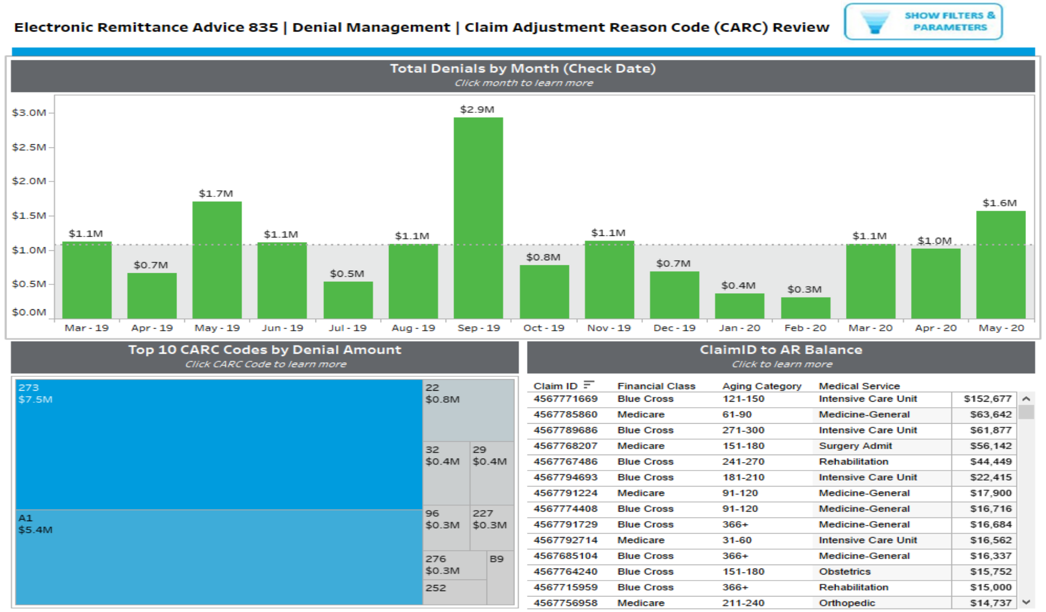
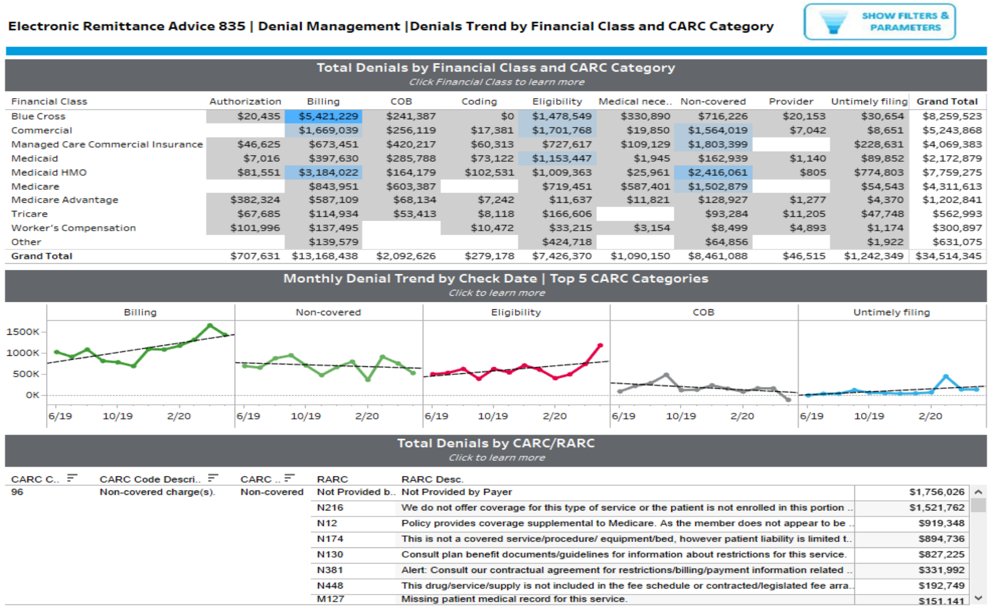
RevNsight Denial Analytics

DASHBOARD EXAMPLES





CONSIDERATIONS

- Are you satisfied with your current revenue metrics?
- Have you considered looking beyond your EMR reporting to quantify your organization's visibility to net revenue and cash collection?
- Have you considered using forward-thinking technologies to improve organization performance?
- Is your organization working as effectively as it should?
- Are there issues with your workflow causing revenue leakage?
- Are all facilities fully optimized?

RevNsight Performance Analytics

Understand your organization’s financial and operational performance

- Quickly determine cash collection and missed revenue with our solution tailored to your needs.

Whether your organization is facing challenges in regards to poor reporting, inadequate processes - or you are looking to recoup lost revenue and budget for next quarter - RSM can help throughout your revenue cycle utilizing our interactive performance analytics application. We drive a tailored and customized solution allowing you to quickly identify cash collection issues and forecast for next year.

DASHBOARD EXAMPLE

Cash Analysis

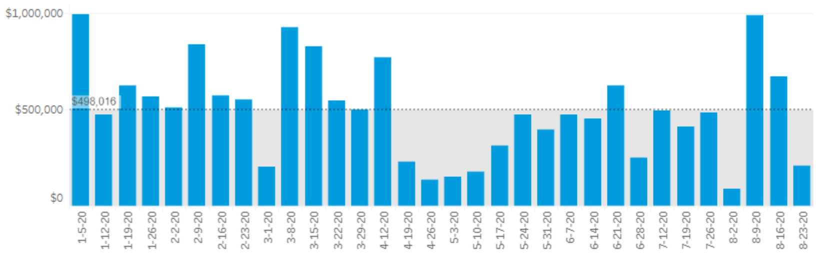
SHOW FILTERS & PARAMETERS

Cash Waterfall All

Service Date Across and Post Date Down

	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Grand Total	Percent of Total: Current Month	Prior Month	Previous Months
Jan-20	1,101,913								**1,101,913**	100.00%		
Feb-20	1,465,515	824,493							**2,290,007**	36.00%	64.00%	
Mar-20	301,605	1,524,033	858,416						**2,684,054**	31.98%	56.78%	11.24%
Apr-20	83,714	303,151	813,519	70,762					**1,271,146**	5.57%	64.00%	30.43%
May-20	45,777	57,272	87,142	83,689	781,641				**1,055,521**	74.05%	7.93%	18.02%
Jun-20	17,998	18,673	36,459	18,463	967,705	980,114			**2,039,412**	48.06%	47.45%	4.49%
Jul-20	14,929	14,874	21,516	19,515	230,804	1,368,982	778,361		**2,448,981**	31.78%	55.90%	12.32%
Aug-20	5,908	7,061	5,087	3,236	20,546	134,650	1,172,131	596,222	**1,944,841**	30.66%	60.27%	9.07%
Grand Total	**3,037,359**	**2,749,558**	**1,822,140**	**195,664**	**2,000,696**	**2,483,746**	**1,950,492**	**596,222**	**14,835,877**			

Week over Week Cash All



Location(s) Included:All
Billing Dr(s) Included:All
Insurance Category:All

RevNSights - RSM Health System

Accounting for your selection, this analysis measures cash by week.

- Average cash was **$498,016** across all **32** weeks.
- Values ranged from **$86,234** (August 2, 2020) to **$996,877** (January 5, 2020).
- Cash decreased by **79%** over the course of the series from **$996,877** to **$209,015** and ended with a downward trend, decreasing by **$461,570** in August 23, 2020.
- The largest single decline on a percentage basis occurred in August 2, 2020 (**-82%**). However, the largest single decline on an absolute basis occurred in April 19, 2020 (**-$543,545**).
- The largest single increase immediately followed the biggest single decrease, when it rose **1,047%** from **$86,234** to **$989,134** in August 9, 2020.
- Cash showed the longest span of consistent growth over **four** weeks from April 26, 2020 to May 24, 2020, **rising by 252%**.
- Cash showed the longest spans of consistent decline over **three** weeks from February 9, 2020 to March 1, 2020, **falling by 76%**, and from March 8, 2020 to March 29, 2020, **falling by 46%**.
- Cash fluctuated over the course of the series with **67%** of data points moving in

OUR APPROACH

- Deployment using your organization’s reporting
- Drill down capability to the item of lowest grain
- Ability to spot trends and identify high dollar accounts in your A/R to accelerate the most cash for the least effort
- Provide weekly support to update, validate and publish the dashboards

OUR INTERACTIVE APPLICATION CAPABILITIES

- Our interactive application allows you to quickly and easily determine the categories with the highest A/R .
- **Questions we can answer:**

✓ WIP changes week to week
✓ Productivity issues
✓ Payer issues
✓ Billing Trends
✓ Account stratification
✓ Front, middle and back revenue cycle issues

REVNSIGHTS

- Our RevNsights empower your end users to understand your data through stories.
- Tailored stories to your end users
- Quickly understand what data is most important
- Easily add stories to your dashboards

CARE GAPS

Care Gaps: How Do We Identify Patients' Needs?

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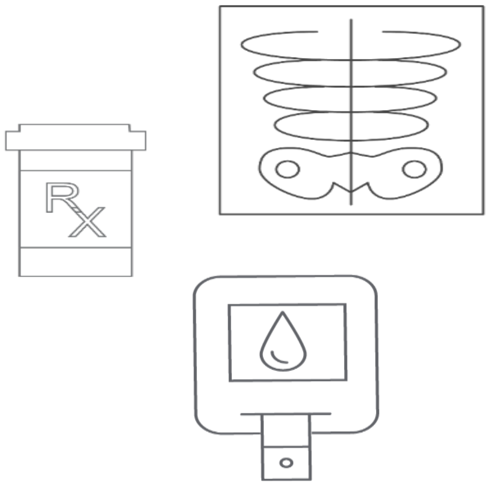
Scheduling	Cancelled appointments
Orders	Labs, images, treatment which was ordered but not performed
Wellness	Best practice preventive care which is overdue
Chronic disease	Best practice preventive care/evaluation/treatment which is overdue
Care path	Care path recommended treatment is not performed
Risk analysis	Patient is in danger of negative event



How Do We Engage the Patient?

Data
- Identify Care Needs
- Organize Patients
- Present Information

Dashboard
- Filter
- Review
- Choose

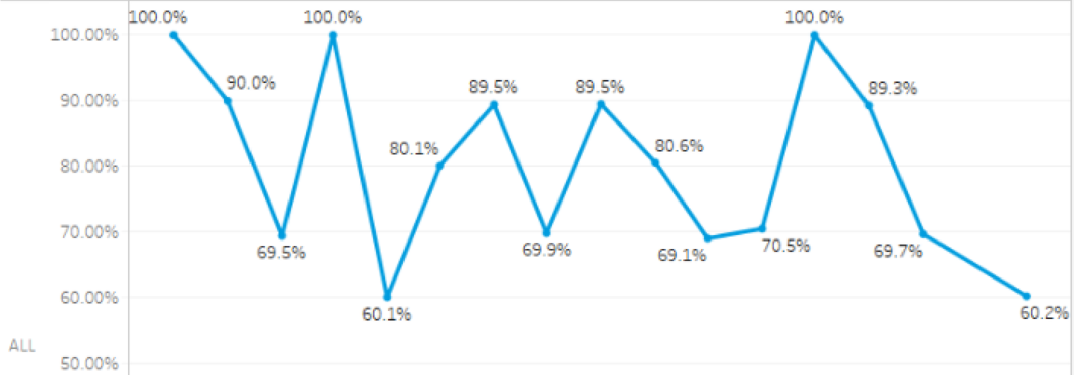
Outreach
- Phone
- Portal
- Text
- Provider

EMR
Salesforce
MS Dynamics

ASC - Preventive Care and Screening: Unhealthy Alcohol Use: Screening and Brief Counseling

80.49%

ASC Metric Over Time



Patients With Care Gap

Client Name	Max. Followup Date	Days Overdue
Berry, Ella	11/7/2018	459
Russell, Joshua	1/19/2019	448
Rutherford, Victor	1/21/2020	440
Mackay, Stephen	2/23/2019	438
Ross, Leonard	6/20/2019	432
Clarkson, Deirdre	4/25/2020	419
Ball, Fiona	1/29/2020	419
Stewart, Jessica	8/7/2020	411
Coleman, Sue	10/17/2018	408
Springer, Elizabeth	12/27/2019	405
Jones, Dominic	8/14/2020	404
Bond, Bella	6/27/2020	403

CASE STUDY:

COPD population health

PROBLEM	GOAL	APPROACH	RESULTS
Pediatric COPD patients frequent emergency room for asthma attacks or other flare ups	Improve chronic disease management for COPD population to reduce acute events	1. Combine EMR data with claims data from payors 2. Identify care gaps • Medication adherence (inhalers) • Regular wellness visits • Diagnostic tests (spirometry) 3. Patient outreach	Reduced avoidable ER visits by 27%

Can also be applied to any chronic disease with preventive care recommendations, including:

- ✓ Diabetes
- ✓ Coronary Artery Disease
- ✓ Depression

CASE STUDY:

Congenital Heart Defects (CHD)

PROBLEM	GOAL	APPROACH	RESULTS
Patients born with heart defects often do not follow-up after diagnosis or surgical repair	Improve care and increase revenue by identifying CHD patients overdue for follow-up and reach out to them	1. Identify forgotten CHD patients mine data including STS Registry, echocardiograms, diagnosis and billing history 2. Classify CHD patients by diagnosis and repair status and clinic/provider 3. Prioritize 4. Enable Follow-up	> 14,000 patients identified > 1,000 follow-ups scheduled > 300 interventions ordered > $7million revenue

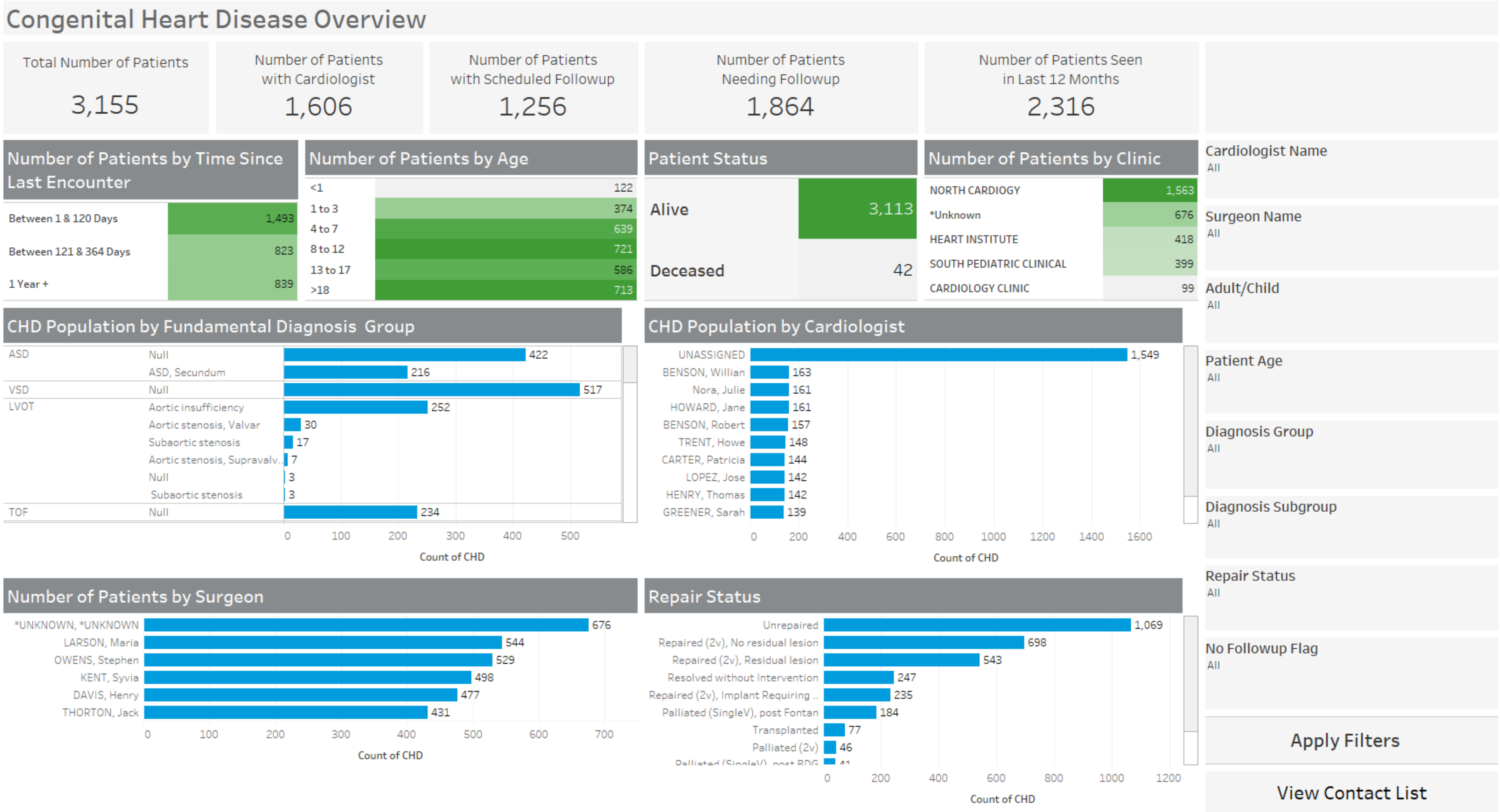
<u>PUBLISHED</u>:

- A Data Mining Tool and Process for Congenital Heart Defect Management in *American Medical Informatics Association*
- System to Identify, Classify and Manage Patients with Structural Heart Defects in *Quality and Productivity Research Conference 2019*

Can also be applied to:

- Any long-term chronic disease where patients may be overdue for assessment
- Adult structural heart defects

DEMO



Congenital Heart Disease Overview
Total Number of Patients
3,155
Number of Patients with Cardiologist
1,606
Number of Patients with Scheduled Followup
1,256
Number of Patients Needing Followup
1,864
Number of Patients Seen in Last 12 Months
2,316
Number of Patients by Time Since Last Encounter
Between 1 & 120 Days 1,493
Between 121 & 364 Days 823
1 Year + 839
Number of Patients by Age
<1 122
1 to 3 374
4 to 7 639
8 to 12 721
13 to 17 586
>18 713
Patient Status
Alive 3,113
Deceased 42
Number of Patients by Clinic
NORTH CARDIOGY 1,563
*Unknown 676
HEART INSTITUTE 418
SOUTH PEDIATRIC CLINICAL 399
CARDIOLOGY CLINIC 99
Cardiologist Name
All
Surgeon Name
All
Adult/Child
All
Patient Age
All
Diagnosis Group
All
Diagnosis Subgroup
All
Repair Status
All
No Followup Flag
All
Apply Filters
View Contact List
CHD Population by Fundamental Diagnosis Group
ASD Null 422
ASD, Secundum 216
VSD Null 517
LVOT Aortic insufficiency 252
Aortic stenosis, Valvar 30
Subaortic stenosis 17
Aortic stenosis, Supravalv.. 7
Null 3
Subaortic stenosis 3
TOF Null 234
0 100 200 300 400 500
Count of CHD
CHD Population by Cardiologist
UNASSIGNED 1,549
BENSON, Willian 163
Nora, Julie 161
HOWARD, Jane 161
BENSON, Robert 157
TRENT, Howe 148
CARTER, Patricia 144
LOPEZ, Jose 142
HENRY, Thomas 142
GREENER, Sarah 139
0 200 400 600 800 1000 1200 1400 1600
Count of CHD
Number of Patients by Surgeon
*UNKNOWN, *UNKNOWN 676
LARSON, Maria 544
OWENS, Stephen 529
KENT, Syvia 498
DAVIS, Henry 477
THORTON, Jack 431
0 100 200 300 400 500 600 700
Count of CHD
Repair Status
Unrepaired 1,069
Repaired (2v), No residual lesion 698
Repaired (2v), Residual lesion 543
Resolved without Intervention 247
Repaired (2v), Implant Requiring .. 235
Palliated (SingleV), post Fontan 184
Transplanted 77
Palliated (2v) 46
0 200 400 600 800 1000 1200
Count of CHD

Supervised Learning

Supervised learning is an approach to creating artificial intelligence, where the program is given labeled input data and the expected output results.

Supervised learning can be used to improve algorithms

CHD

- Design workflows for following up identified patients
- Allow providers to review the patient charts, prioritize and assign follow-up dates
- For patients who come to cardiology follow-ups, track whether further intervention was ordered
- Reprioritize identified patients based on learning feedback from #2 (how soon the chosen follow-up date was) and #3

Blood Utilization

- Adjust thresholds based on physician inputs

Revenue Integrity

- Use manual auditing to identify and classify additional charts for improvement

EFFICIENCY AND PATIENT MOVEMENT

Goals and Opportunities

- Reduce length of stay
- Reduce ED and PACU boarder time
- Increase surgical and transfer volumes
- Improve quality of care
- Optimize staffing

How?

- Reduce unnecessary bottlenecks and delays
- Predict occupancy and patient needs
- Know occupancy constraints ahead of time and mitigate them

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Reducing Length of Stay

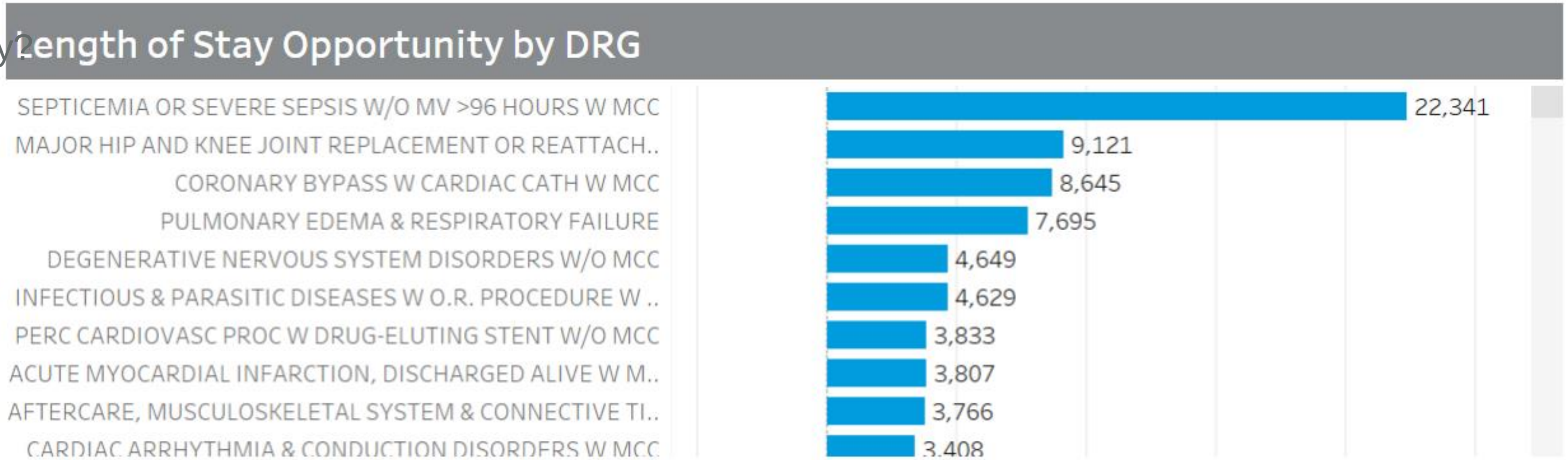
Length of stay is the biggest factor for inpatient cost.

There are two fundamental ways to reduce LOS

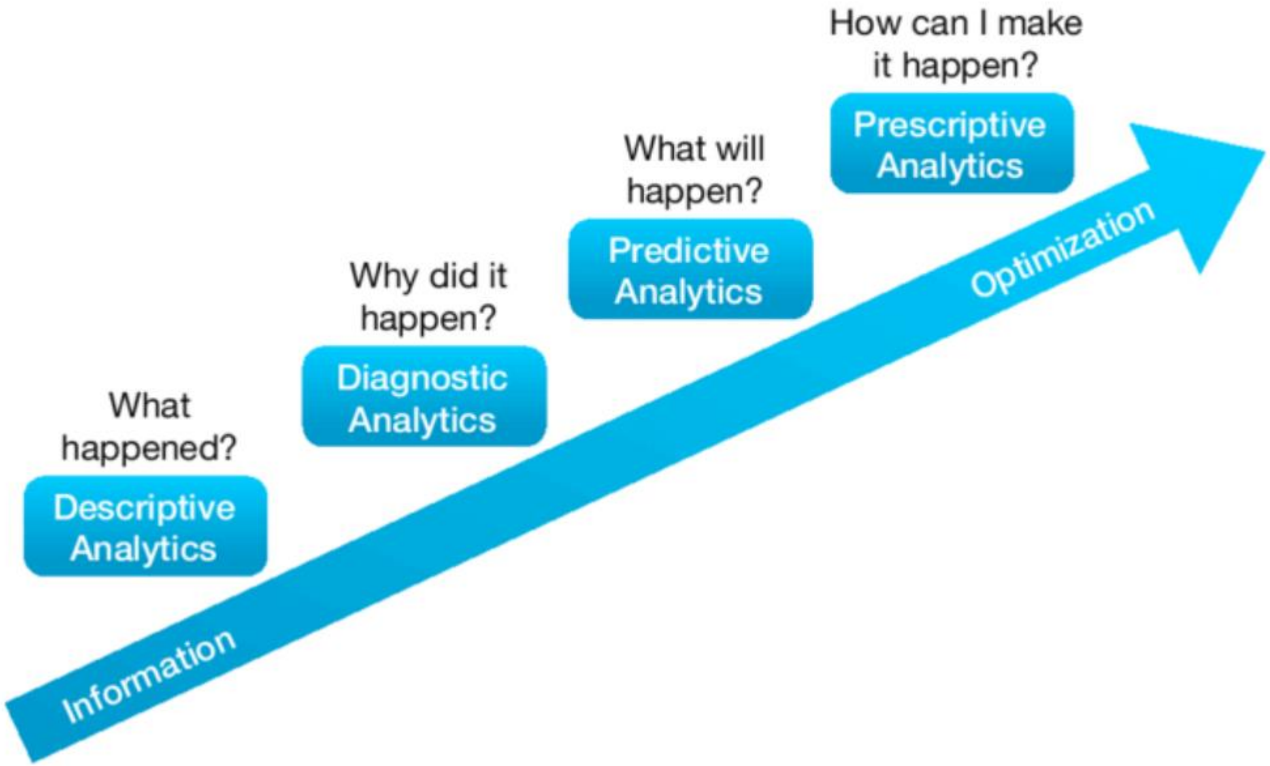
1. Be more efficient
   - Reduce Wait Times (ED boarder, PACU boarder, Patient Movement, Discharge)
   - Optimize multi-disciplinary rounds
2. Cure patients faster
   - Disease Care Paths ▪ Reduce Complications

The first step is identify opportunities

➢What diseases have greatest length of stay opportunity?
➢What units or processes have inefficiencies?
➢What complications are affecting length of stay?



Iterative Approach



Analytics

- When and where are the bottlenecks?

Causal Analysis

- What is causing delays?

Predictive Analytics

- What will the occupancy be?

Discrete Event Modeling

- What actions or resources will help us improve?

Efficiency and Patient Movement

- Track all patient movements
- Forecast expected patient movements
- Measure patient movement time
  - By origination, target, day, time, service
- Identify delays and patterns
- Causal analysis: What is causing delay?
  - Lack of capacity?
  - Waiting on another event?
  - Process?

USE CASES

Discharges

- Order wheelchairs and walkers prior to discharge order

ED

- Improve sepsis care by creating ED lab
- Reduce overflow by predicting volumes 72 hours ahead

Admissions

- Predict capacity issues ahead of time
- Reduce number of people waiting for a bed from 78 to 24 a day

ICU

- Reduce number of patients waiting for ICU bed by 33%
- Create capacity by designing ICU observation area
- Reduce number of held empty beds

Transfers

- Reduce transfer cancellation rate by 40%

Digital Twin

- Use discrete event simulation to test what-if scenarios and optimize resource allocation

Case Study: Predicting ED Arrivals and Occupancy

PROBLEM: Emergency Department overfills causing long delays and emergency procedures to create occupancy

GOAL: Predict high occupancy in the emergency room to allow mitigation efforts

APPROACH:

1. Obtain historical data for emergency room patients
2. Augment data with local weather, holidays and events data
3. Predict ED arrivals

- Evaluate and choose features and algorithms, train and test
- Chosen features: day of week, time of day, date, temperature, relationship to holidays

4. Predict ED length of stay for patients in the ED using statistics

Based on partial information from: service, date, time, diagnosis, ED events

5. Predict future occupancy

This is a calculation using predicted ED arrivals, current occupancy and predicted ED length of stay for current patients

RESULTS:

Able to predict overflow as Yellow, Orange or Red (previous was just red)
Alerts up to 96 hours ahead
78% accuracy at 72 hours

Can also be applied to:
Urgent Care
Walk-In Clinics
OR

Case Study: Digital Twin

PROBLEM: Adding resources or demand in one area of a hospital can cause bottlenecks in other areas.

GOAL: Analyze resource constraints and what-if scenarios to predict bottlenecks, occupancy and length of stay. Use this analysis to optimize resource allocation

APPROACH:

1. Map the resources (beds, imaging machines, etc)
2. Fill in what each resource can support (patient type, movement) through data profiling and manual review
3. Extract the clinical treatment plan from historical encounters
4. Randomly push patients/treatment plans through the hospital to test resource constraint usage, bottle necks, throughput
5. Allow resources to be edited to test what if scenarios

PUBLISHED:
Predicting Hospital Capacity and Efficiency in *11th International Conference on Health Informatics*

Can be applied to:

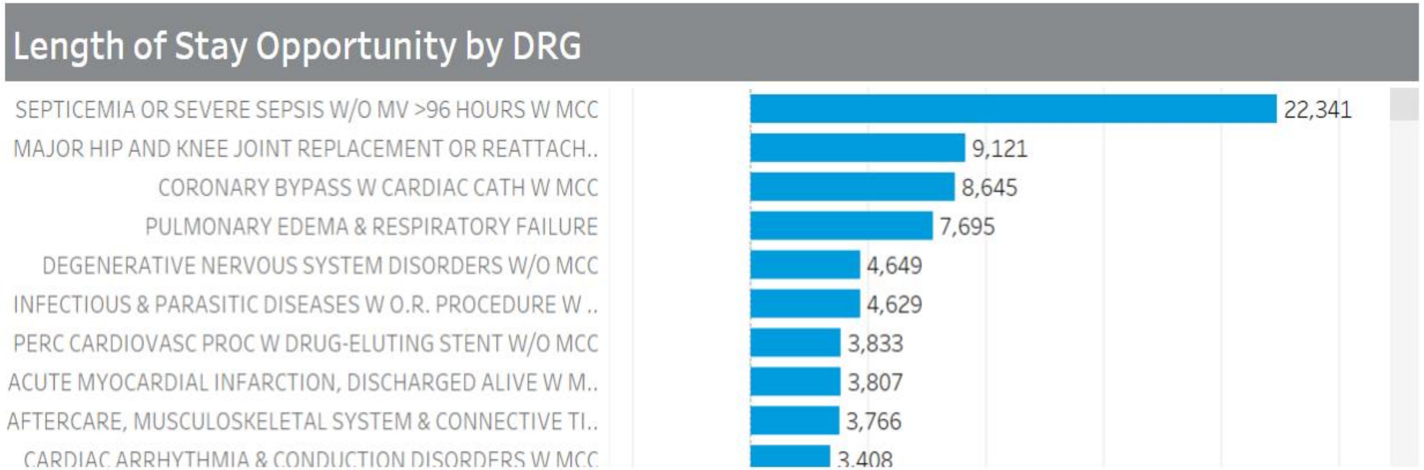
- Beds
- Staffing
- Imaging resources
- Clinics
- Operating Rooms

CARE PATHS

RSM

Standardized Care Paths

- Best practice care pathways can be found as flow charts and decision points in literature. Pathways are defined for both acute encounters and chronic disease treatment.
- Standardized analytics apply across all of the care pathways.
- These processes can be implemented and tracked and measured using standardized technology and process intelligence engines



Use Case: Congestive Heart Failure

Protocol

1. Identification
chief complaint, temperature, blood pressure, pulse
2. Evaluation
blood labs, EKG, chest x-ray, BNP
3. Treatment
Diuretics, oxygenation, weight management
4. Follow up

Results

↓ LOS 1.5 days
↓ Direct cost 16%
↓ Readmission 22%
↓ Mortality 60%

Pubs

- Improving Patient Care Through Analytics *in ISCBI*
- Accelerating Analytics for Clinical Pathways to Drive Cost Reduction and Quality Improvement *in IEEE IRI*

Heart Failure	Sepsis	Sickle Cell Anemia	Stroke	Pneumonia	COVID-19
Acute Coronary Syndrome	Asthma	COPD	Colon Surgery	Preeclampsia	NICU Vent Weaning

Inpatient Quality: Target Analytics by Care Path

Heart Failure	Sepsis	Sickle Cell Anemia
Stroke	Pneumonia	COVID-19
Acute Coronary Syndrome	Asthma	COPD
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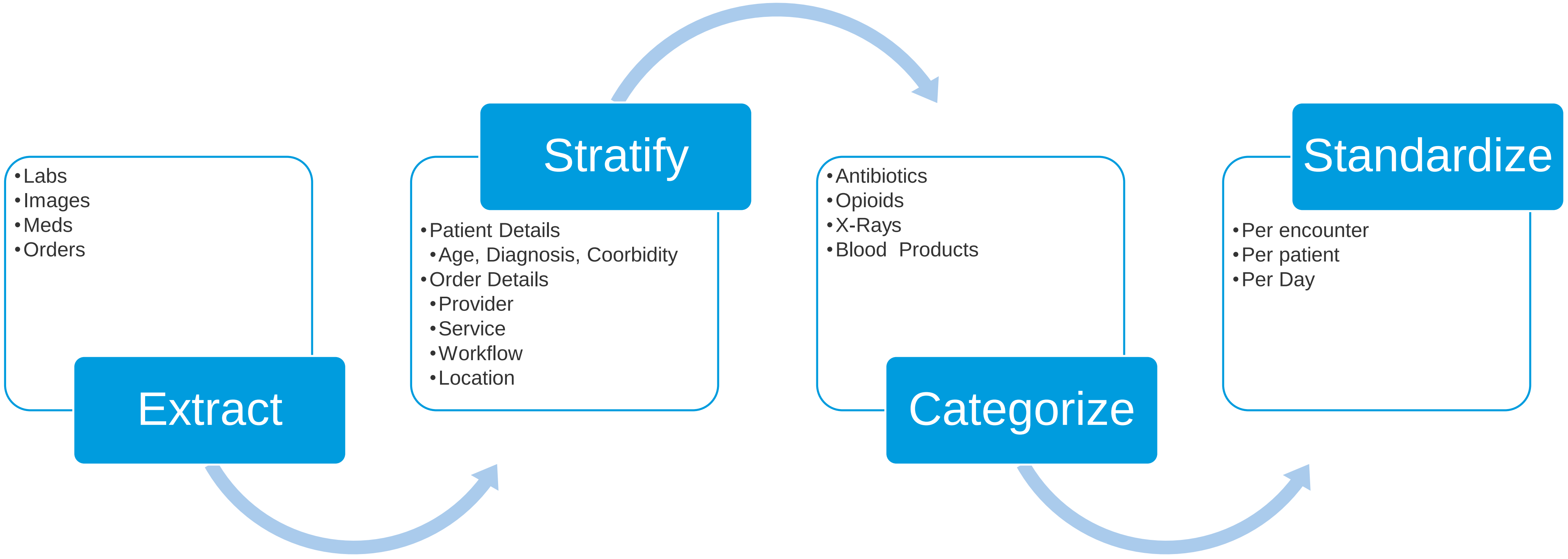
Significant improvement achieved with second iteration

CLINICAL EFFECTIVENESS

Reduce Clinical Variation, Save On Costs: DO MORE WITH LESS

Unwarranted clinical variation refers to medical practice pattern variation that cannot be explained by illness, medical need, or the dictates of evidence-based medicine. It is one of the causes of low value care often ignored by health systems.

- Our challenge is to **identify clinical variation** and **analyze if it is warranted**.



CASE STUDY:

Congestive Heart Failure (CHF)

GOAL	APPROACH	RESULTS
Optimize CHF order set	1. Analyze all orders utilizing the CHF orderset 2. Analyze all orders for CHF patients which do not utilize the CHF Orderset	As part of this analysis, we learned that a full narcotics screen was being ordered for 95% of CHF patients. Our data showed no clinical usage of the results of this lab, and we then verified this with providers. We removed the narcotics screen from the default list of orders in the CHF orderset.

Can also be applied to:
Any orders

CASE STUDY:
POKE-R

PROBLEM	GOAL	APPROACH	RESULTS
PICU patients receive lots of "pokes," increasing cost, reducing patient experience and causing hospital acquired infections	Provide information to providers to allow reduction of poke	1. Define a poke Identify which orders count as "pokes" including blood labs, IV medications, radiology and invasive procedures. 2. Present poke information to providers – including: a. Past pokes and scheduled pokes b. Cost information c. Insure data is available during structured rounds	12.5% reduction in pokes 5 year savings $11,058,085 in 26 bed PICU

<u>PUBLISHED</u>:

- Avoiding Pain and Unnecessary Interventions and Reducing Cost in the PICU in *Critical Care Medicine*
- Poke-R - Using Analytics to Reduce Patient Harm in *10th International Conference on Health Informatics*

CASE STUDY:

Blood Utilization

PROBLEM	GOAL	APPROACH	RESULTS
Patients sometimes receive blood transfusions when not clinically required. This causes adverse outcomes.	Reduce unnecessary red blood cell transfusions, improve outcomes, reduce cost	1. Evaluate the clinical necessity of blood transfusions based on hemoglobin, base deficit, blood pressure, scvO2, lactate, blood loss, diagnosis 2. Analyze blood wastage and returns 3. Provide information for provider evaluation 4. Use supervised learning to adjust thresholds based on provider evaluations	• $3.3 million annual savings • 23% fewer units • 46% fewer non-indicated units

PUBLISHED:
Reducing Red Blood Cell Transfusions in *International Conference on Information Technology in Bio- and Medical Informatics (ITBAM)*

PATIENT EXPERIENCE

Patient Experience and Health Equity: Background

90% of patients look at customer reviews before scheduling a provider.

Did you know that hospitals with high patient experience are more profitable? And that consumers with high satisfaction scores achieve better long-term outcomes?

- Patients with high patient experience are 5 times more likely to return to a provider
- 96% of healthcare consumers perceive patient experience as important or very important
- Hospitals with high patient experience have 2 – 3 times higher net margins
- Long term patient outcomes and survival rates are 25% higher for satisfied patients
- 96% of online patient complaints center around customer service — not quality of care
- People of color or lower income have greater infant mortality, lower life expectancy, lower patient experience scores, more health complications, and are less likely to be insured.
- By 2024, most value-based care contracts will measure patient experience and health equity

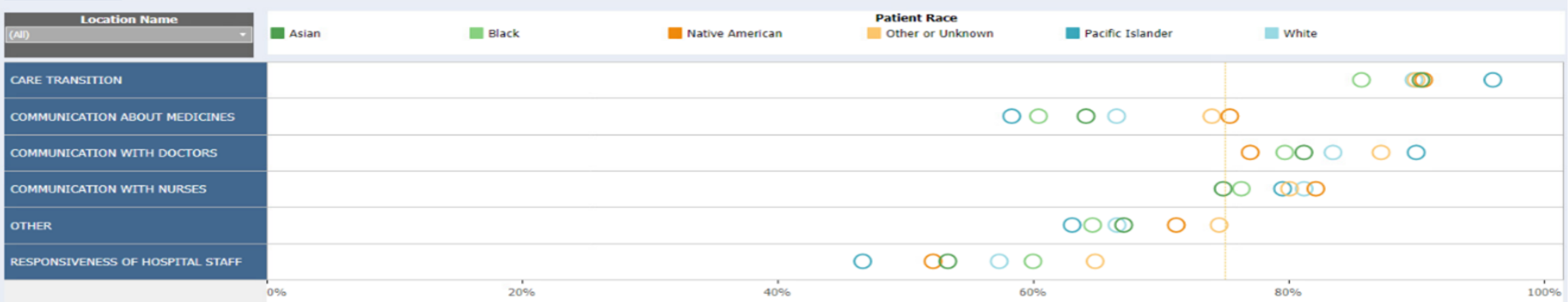
Patient Experience and Health Equity: Project

Client(s)	Goal	Initial State Challenges
Corewell Health	Enterprise analytics to 1. Measure patient experience and health equity across the system 2. Identify opportunities for performance improvement	• Stale analytics from vendor • Disparate analytics from different portions of the health system and different verndors • Lack of root cause analysis • Inability to identify how to improve

Solution
Data warehouse solution to import vendor results into single, timely version of truth at enterprise level
Use percentiles and benchmarks to create a standardized “gpa”
Stratify by question, service, provider and unit to understand who has challenges with what
Stratify by race, education, age, gender, income, sexual orientation and language to include health equity
Integrate patient outcomes (mortality, length of stay, readmission, disposition) to get full view

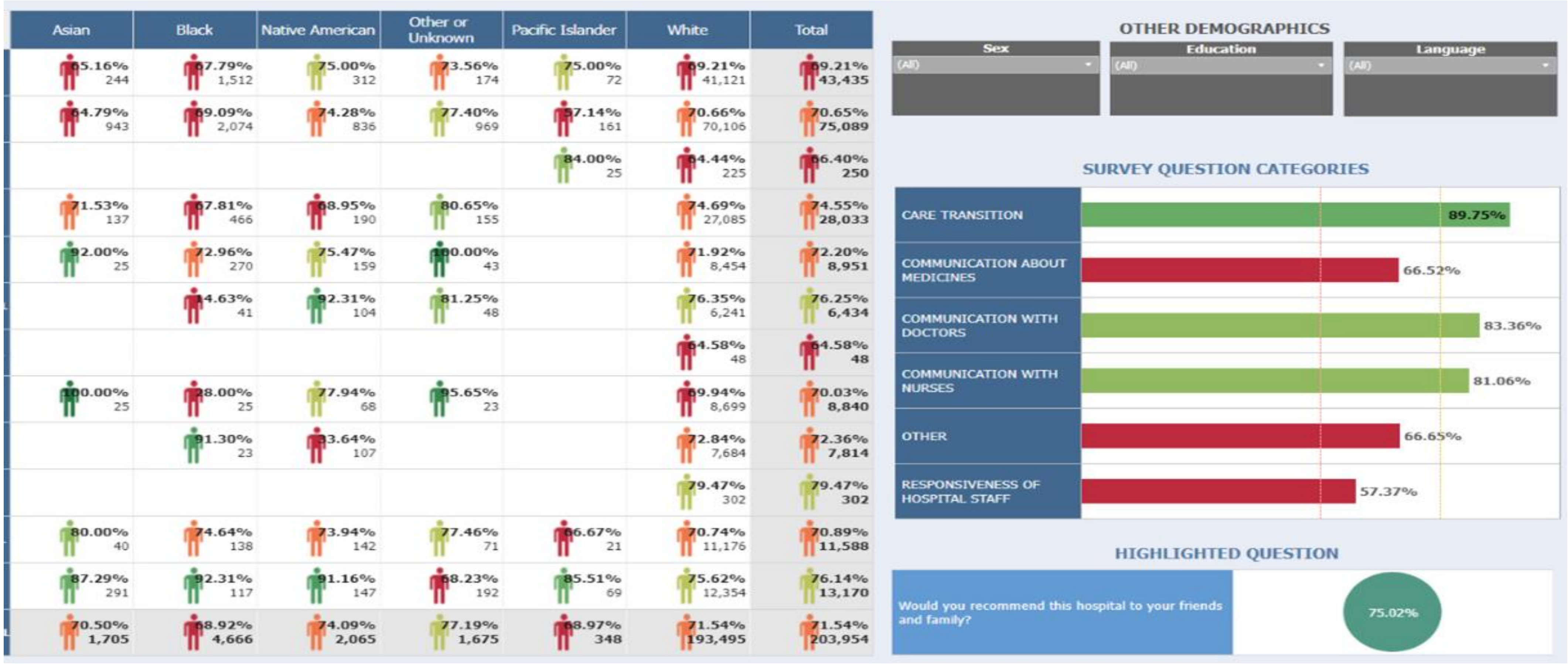
Patient Experience and Health Equity: Demo

- Combine patient experience scores with details about patient care
- Measure patient experience for all types of care, not just inpatient
- Measure and review patient experience score early and proactively
- Evaluate patient experience and outcomes by race, language, geography, gender, age



	Asian	Black	Native American	Other or Unknown	Pacific Islander	White
During your hospital stay, did you get information in writing about what symptoms or	95.56%	85.91%	89.09%	91.20%	100.00%	91.68%
During this hospital stay, how often did nurses treat you with courtesy and respect?	82.67%	83.33%	90.43%	84.00%	93.33%	88.69%
During your hospital stay, did hospital staff talk with you about whether you would	84.96%	85.60%	93.49%	89.15%	92.31%	88.21%
During this hospital stay, how often did doctors treat you with courtesy and respect?	85.14%	84.76%	75.53%	89.19%	93.33%	87.43%
During this hospital stay, how often did doctors listen carefully to you?	77.33%	74.64%	78.49%	85.33%	86.67%	79.53%
During this hospital stay, how often did nurses listen carefully to you?	77.03%	72.38%	76.34%	77.63%	71.43%	78.21%
During this hospital stay, how often did nurses explain things in a way you could	64.86%	73.21%	79.57%	78.67%	73.33%	76.76%
Before giving you any new medicine, how often did hospital staff tell you what the	71.82%	76.09%	84.96%	82.61%	92.00%	76.11%
During this hospital stay, how often did doctors explain things in a way you could	74.67%	75.12%	75.27%	82.19%	80.00%	75.25%
Would you recommend this hospital to your friends and family?	76.00%	67.79%	73.12%	86.67%	60.00%	75.13%
Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the	73.68%	69.19%	72.63%	82.43%	62.50%	74.19%
How often did you get help in getting to the bathroom or in using a bedpan as soon	64.76%	62.03%	74.36%	75.82%	60.87%	66.88%
During this hospital stay, how often were your room and bathroom kept clean?	62.16%	59.24%	77.42%	71.62%	66.67%	65.82%
During this hospital stay, after you pressed the call button, how often did you get	68.49%	59.80%	70.29%	74.10%	60.00%	61.58%
During this hospital stay, how often was the area around your room quiet at night?	53.33%	60.00%	52.17%	64.86%	46.67%	57.36%

Patient Experience and Health Equity: Project



	Asian	Black	Native American	Other or Unknown	Pacific Islander	White	Total
	65.16% 244	67.79% 1,512	75.00% 312	73.56% 174	75.00% 72	69.21% 41,121	69.21% 43,435
	64.79% 943	69.09% 2,074	74.28% 836	77.40% 969	57.14% 161	70.66% 70,106	70.65% 75,089
					84.00% 25	64.44% 225	66.40% 250
	71.53% 137	67.81% 466	68.95% 190	80.65% 155		74.69% 27,085	74.55% 28,033
	92.00% 25	72.96% 270	75.47% 159	100.00% 43		71.92% 8,454	72.20% 8,951
		[illegible]4.63% 41	92.31% 104	81.25% 48		76.35% 6,241	76.25% 6,434
						64.58% 48	64.58% 48
	100.00% 25	28.00% 25	77.94% 68	95.65% 23		69.94% 8,699	70.03% 8,840
		91.30% 23	33.64% 107			72.84% 7,684	72.36% 7,814
						79.47% 302	79.47% 302
	80.00% 40	74.64% 138	73.94% 142	77.46% 71	66.67% 21	70.74% 11,176	70.89% 11,588
	87.29% 291	92.31% 117	91.16% 147	68.23% 192	85.51% 69	75.62% 12,354	76.14% 13,170
	70.50% 1,705	68.92% 4,666	74.09% 2,065	77.19% 1,675	68.97% 348	71.54% 193,495	71.54% 203,954

TOOL RATIONALIZATION

Use Case: Corewell Health by the Numbers

Corewell Health™

- Non-profit health system
- Largest health care provider in Michigan
- Merger of Spectrum, Beaumont and Lakeland
- 21 hospitals, >6,000 beds and >300 locations
- >12,000 physicians and >65000 employees
- $16.4B in revenue

Priority Health

- 1.3 million members
- Nationwide PPO, Michigan HMO, employer plans, Medicaid, Medicare Advantage
- Acquired Indiana's Physicians Health Plan in 2024

Corewell Health Technologies

Key Sources

Epic workday qualtrics UKG salesforce

Support Systems

Strata vizient servicenow alteryx Streamlit

Technology
(at start)

Qlik snowflake Microsoft Fivetran SAP SAP BusinessObjects tableau Power BI

Finding savings

$3M+ in Savings Annually

Stop paying $ to copy data

Save $ on FiveTran, Qlik, Dbt

Use Epic data in place

Reduce Snowflake cost

Consolidate BI and AI

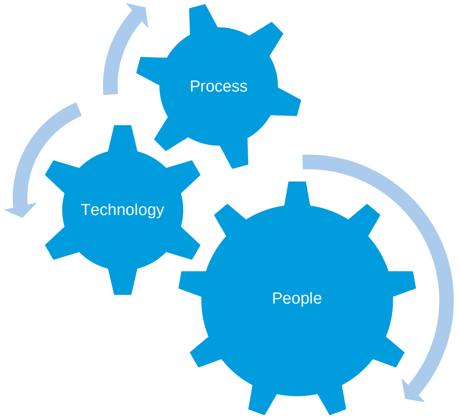
Save on SAP, Qlik, Tableau, SageMaker, StreamLit

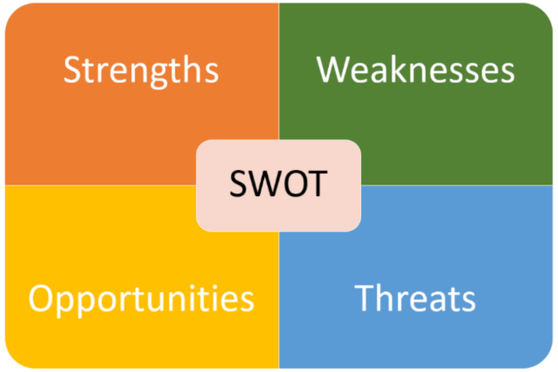
Increase Self Service and Data Availability

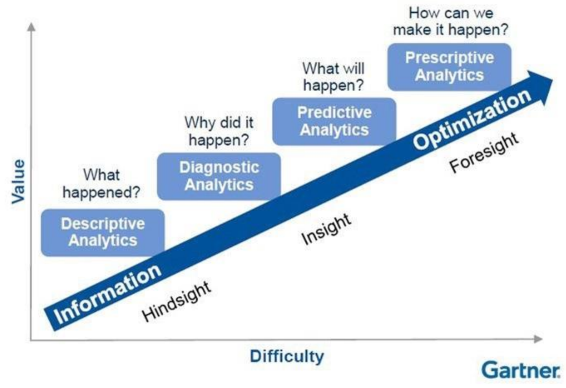
Save $ on FiveTran, Qlik

GETTING STARTED

4-6 weeks







Interview Leaders

- Understand needs, goals and pain points

Review Current State

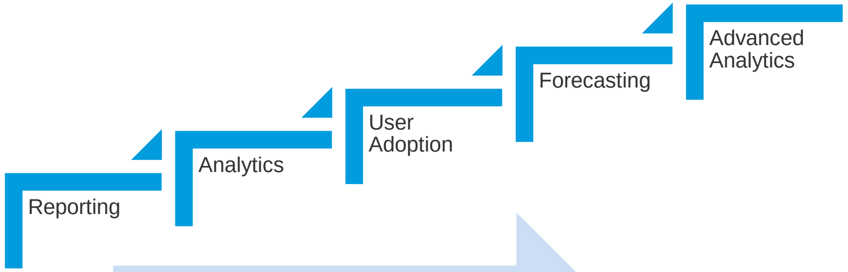
- Examine data architecture, sources, tools and solutions

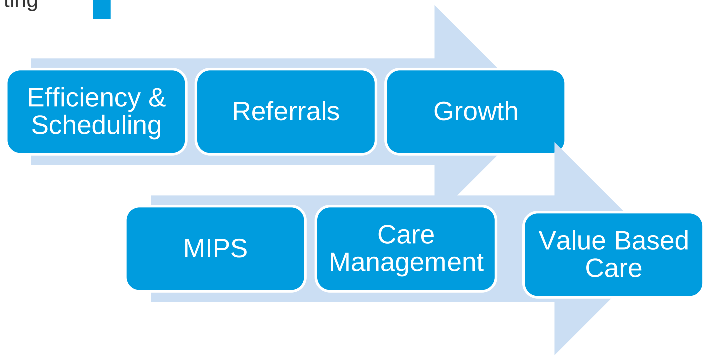
Analyze Process

- Understand current process for analytics requests, scoping, data definitions, prioritization and delivery

Roadmap

- Work together to create a strategic roadmap to become more data driven and get more value from analytics





Traditional assessment plus quantify ROI

LOS Opportunity	Discharge Efficiency	ED Boarder Time	Scheduling Efficiency	OR Block Utilization
Denials	Write-offs	CMI	Market share for specialties	Avoidable ED visits
Supply cost	Clinical variation	Supply waste	Blood utilization	ACO Metrics
Medicare Wellness	Readmissions	Observation Analytics	Payment Variation	Cash Collections
Authorizations	LWBS rates	Preference card analysis	Pharmacy costs	Automation Opportunities

Example Assessment – Opportunities Identified

Focus Areas	Est. Moderate	Est. Aggressive
Surgical Efficiency and Process Improvement	$ 2,000,000.00	$ 2,400,000.00
Patient Throughput and Care Management-Decrease LOS and Social Admissions	$ 5,000,000.00	$ 10,000,000.00
Clinical Volume Growth and Process Improvement	$ 2,000,000.00	$ 2,500,000.00
Revenue Growth Strategy*	$ 5,600,000.00	$ 14,200,000.00
Intermediate Care Facility /CMS Innovation Project	$ 1,350,000.00	$ 3,700,000.00
Disease Specific Anaytics	$ 1,500,000.00	$ 2,500,000.00
Clinical Effectiveness	$ 2,500,000.00	$ 4,000,000.00
Staffing Resource Management	$ 2,000,000.00	$ 3,000,000.00
Pre-Service / Patient Access	$ 1,950,000.00	$ 3,100,000.00
Revenue Integrity / HIM / Coding	$ 1,260,000.00	$ 2,410,000.00
Billing and Reimbursement	$ 4,550,000.00	$ 8,900,000.00
Clinical Documentation Improvement (CDI)	$ 5,600,000.00	$ 8,500,000.00
Supply Chain	$ 2,770,000	$ 4,035,000.00

Microsoft's Azure Accelerate program can co-fund pilots, planning & migration

Kickstart Your Data Journey with Microsoft Funding

Funded Pilots & Migration

Microsoft offsets costs for clients to stand up their own Fabric or migrate Snowflake to Azure, including proof-of-concept builds

Funded Planning & Roadmap

Microsoft provides up to $15K to support an assessment and roadmap—helping hospitals plan their Fabric and data strategy at little to no cost

Data & AI Enablement

Support for data migration, integration, and AI readiness on Fabric

Faster Time to Value

Achieve measurable ROI faster with co-funded pilots and guided execution

Microsoft Fabric:

Unified analytics platform

- ✓ **Seamless integration** within the **Microsoft ecosystem** (e.g., Power BI, Azure, OneLake)
- ✓ Optimized for **real-time analytics** and insights
- ✓ **Unified data architecture** that simplifies analytics and governance
- ✓ **Shortcuts & Mirroring**

QUESTIONS & ANSWERS

QUESTIONS AND ANSWERS?

Let's Connect

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THE POWER OF BEING UNDERSTOOD
ASSURANCE | TAX | CONSULTING

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