



# Care Pathways and Analytics for the Advancement of Healthcare:

## CJR Experience



**Donald Kosiak, MD**

SVP and CMO, Health Group  
Leidos

**Jonathan Scholl**

President, Health Group  
Leidos

**Jack Ziffer, PhD, MD**

EVP and CMO  
Baptist Health South Florida

The Leadership Institute  
10.18.19

# Who is here today...



~\$3Bn Healthcare System

- 10 hospitals, "tntc" OPCs
- ~20,000 employees
- ~3,000 physicians

Serving South Florida, Latin America, Caribbean



Highest levels of patient, employee, physician satisfaction/engagement

Miami Cancer Institute

Miami Cardiac and Vascular Institute

Miami Orthopedic and Sports Medicine Institute

Baptist Health Neurosciences Institute



~\$2Bn Health Care Company, part of a \$10Bn enterprise

- Electronic Health Record Implementation and Optimization
- Medical Exams & Nurse Advice Lines
- Behavioral Health
- Enterprise IT outsourcing, migration and management
- Biomedical Research and Development



Rank: # 1



Rank: # 1



Rank: # 1



Rank: #1



**Baptist Health South Florida**

Forbes: August 29, 2017



## Research hospitals dominate the top 10

“We have seen a significant shortage of healthcare professionals in the U.S. for years,” says Indeed Senior Vice President Paul D’Arcy. “With rapid growth in demand for nurses and doctors, and a much slower growth in supply, many professionals with these highly technical skills are finding the job market to be in their favor.”

<http://blog.indeed.com/2017/08/28/best-places-to-work-hospitals/>

<https://www.forbes.com/pictures/59a44f8931358e7762b8f002/2-baptist-health-south-fl/#416edc025c98>

## Best hospitals to work for in 2017

Top rated hospitals according to Indeed company reviews

- |  |   |
|--|---|
| 1. Massachusetts General Hospital - Boston, MA     | 6. Michigan Medicine - Ann Arbor, MI              |
| 2. Baptist Health South Florida - Coral Gables, FL | 7. Yale New Haven Health - New Haven, CT          |
| 3. Houston Methodist - Houston, TX                 | 8. Children’s Healthcare of Atlanta - Atlanta, GA |
| 4. Montefiore Medical Center - New York City, NY   | 9. Florida Hospital - Orlando, FL                 |
| 5. Texas Children’s Hospital - Houston, TX         | 10. Stanford Health Care - Palo Alto, CA          |

# Niels Bohr:

## Father of the electron and quantum mechanics



[https://www.nobelprize.org/nobel\\_prizes/physics/laureates/1922/bohr-facts.html](https://www.nobelprize.org/nobel_prizes/physics/laureates/1922/bohr-facts.html)



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# Good Luck vs Bad Luck



[https://www.google.com/search?q=images+horseshoe+and+good+luck+or+bad+luck&safe=active&tbm=isch&source=iu&pf=m&ictx=1&fir=jq67UO2BkUIINM%253A%252CP6cU0GsMTuwPIM%252C\\_&usg=\\_\\_VVKhafjSgFW2Ett8NAMCtjKaUV4%3D&sa=X&ved=0ahUKEwj9o6L7qPjWAhVH2yYKHW3DACMQ9QEIMTAD#imgsrc=jq67UO2BkUIINM:](https://www.google.com/search?q=images+horseshoe+and+good+luck+or+bad+luck&safe=active&tbm=isch&source=iu&pf=m&ictx=1&fir=jq67UO2BkUIINM%253A%252CP6cU0GsMTuwPIM%252C_&usg=__VVKhafjSgFW2Ett8NAMCtjKaUV4%3D&sa=X&ved=0ahUKEwj9o6L7qPjWAhVH2yYKHW3DACMQ9QEIMTAD#imgsrc=jq67UO2BkUIINM:)



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# Neils Bohr



“Do you, a sober man dedicated to science, believe in that superstition?”

“Of course not,” replied Bohr,  
but it’s supposed to be lucky, whether you  
believe in it or not.”

<https://quoteinvestigator.com/2013/10/09/horseshoe-luck/>



**Baptist Health South Florida**

M A Weingarten

# With luck, good doctors make a difference

Michael A Weingarten

## SUMMARY

*The luckiest general practitioners work in an ideal environment with a perfect patient population, their clinical intuitions are always correct, they face difficulties with total equanimity, and they get on with all their patients. In the real world one needs a lot of luck for things to go right. This paper applies the philosophical concept of 'moral luck' to the world of general practice.*

**Keywords:** intuition; physician-patient relations; luck; ethics.

- Character luck
- Outcomes luck
- Circumstantial luck

## Introduction

**W**E are acutely aware of the dangers of demoralisation, burnout, and unhappiness in general practice, and in a very real sense we all need a lot of luck to remain happy in clinical practice. Despite our best efforts and intentions, things sometimes turn out for the worst and not for the best. The basic paradox is that you can do the right thing, but you also need good luck for it to turn out right. Who has not had a bereaved patient say something like 'If only you'd have sent him in earlier', when you know very well that you did everything absolutely right, but that you simply cannot save them all? This paradox is not confined to medical practice alone, but applies to all those areas of life where doing the right thing is involved, and it has been called the paradox of 'moral luck'.<sup>1,2</sup> This article examines some of the implications of moral luck for the practice of clinical medicine, following the recent publication of a book by the bioethicist, Donna Dickenson.<sup>3</sup>





June 18, 2016  
(Practice until you get it right.)



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# Colorado Symphony Orchestra

“Practice until you can’t get it wrong.”



<https://images1.westword.com/imager/gene-sobczak-returns-to-head-the-colorado/u/original/6495484/orchestra7460293.28.jpg>



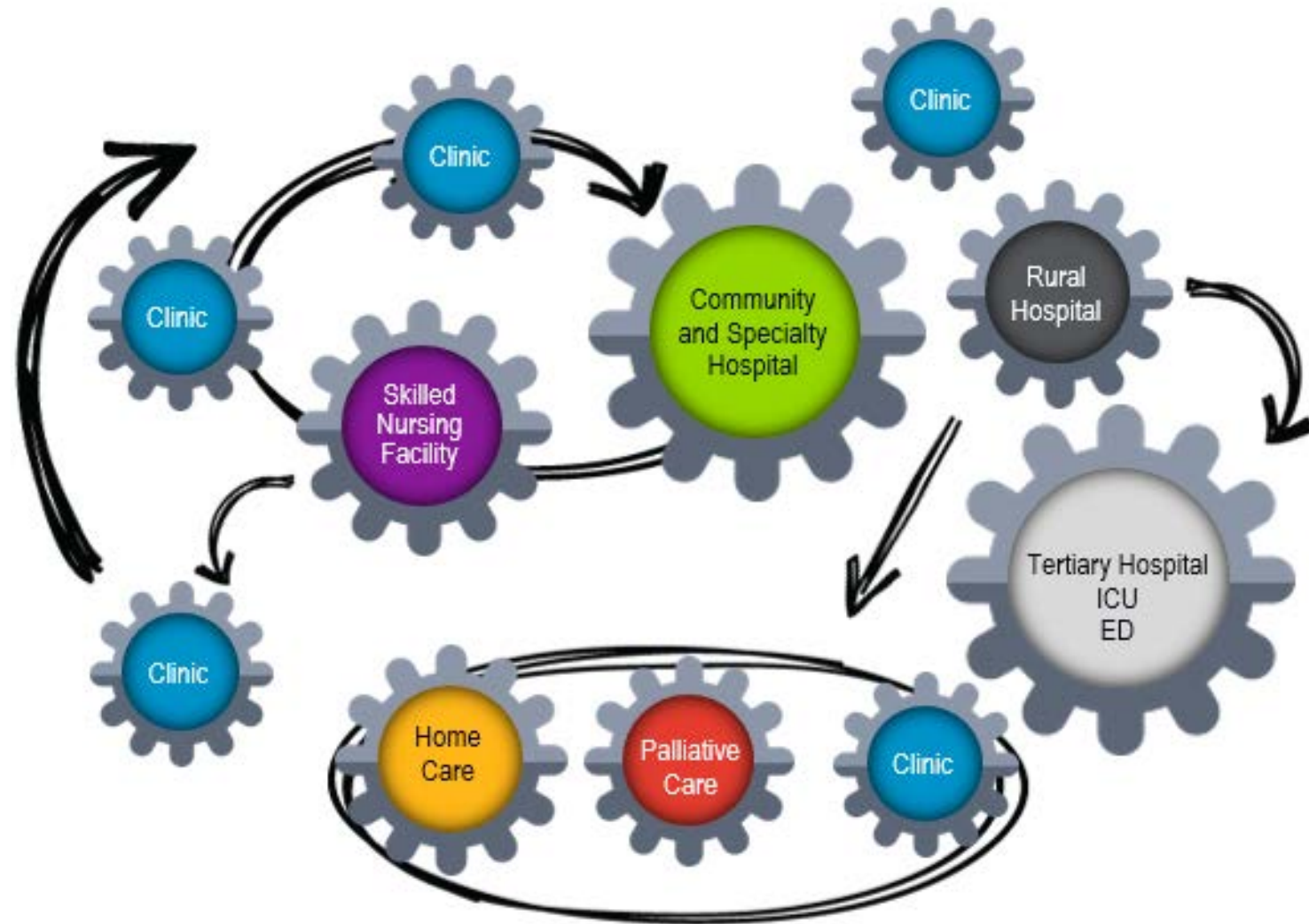
**Baptist Health South Florida**

# Objectives

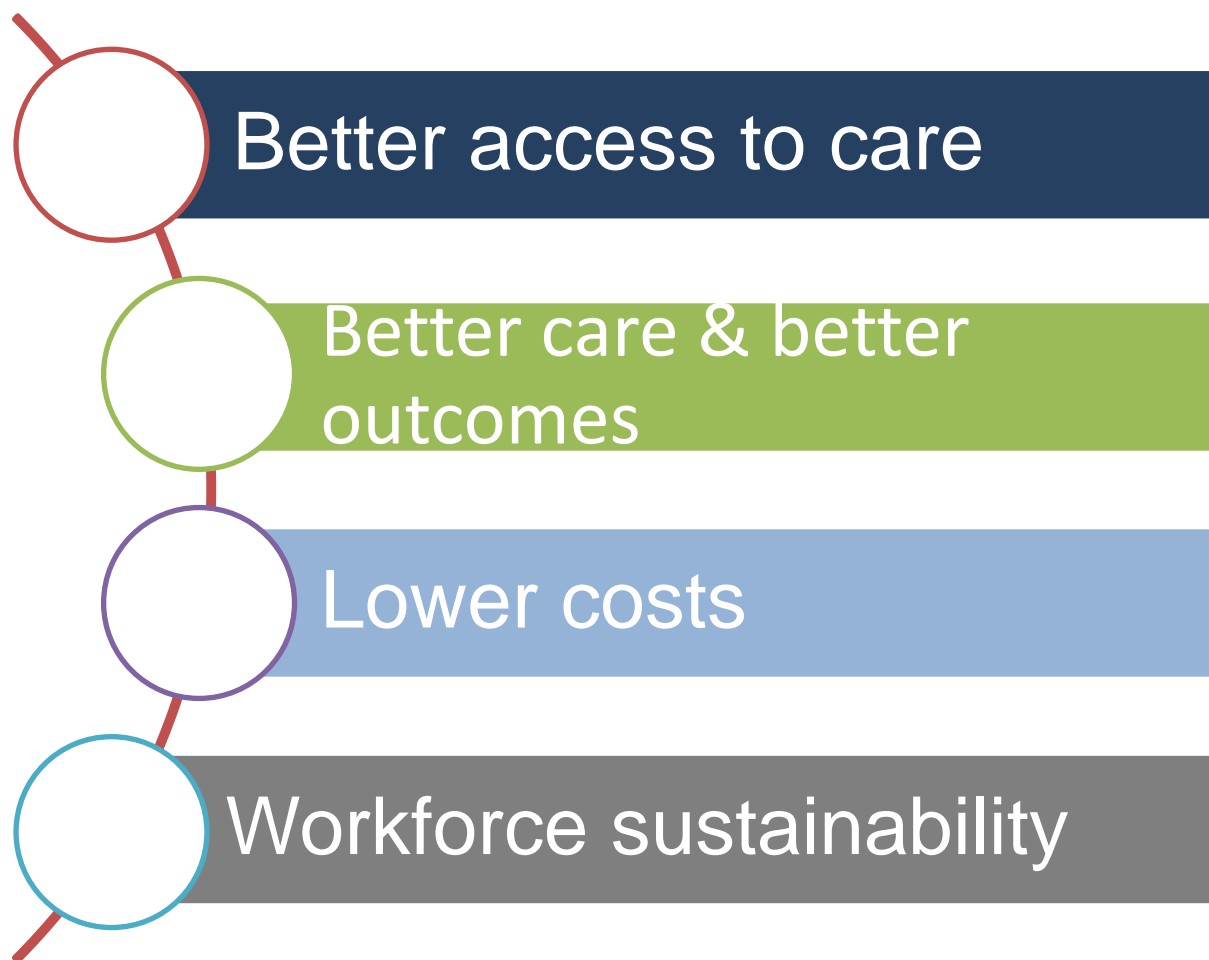
- We are familiar with the challenge
- “Big Data” or “Big Workflow?”
- What BHSF has been up to
  - Clinical change management
  - Workflow enablement
  - Results to date
  - Next steps
- Discussion



# Healthcare Ecosystem



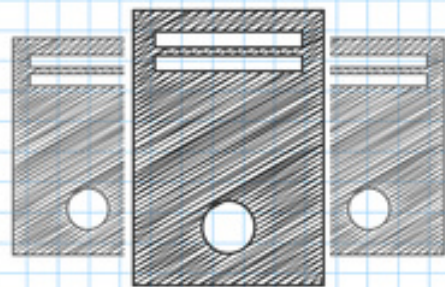
# Purpose and vision of change



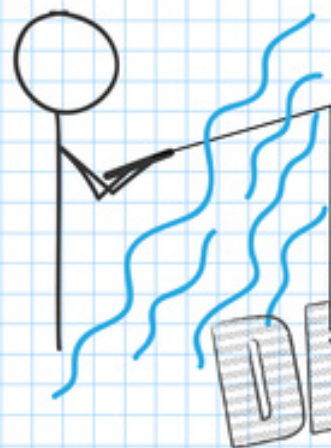


## CHARACTERISTICS

**V**olume  
Velocity  
Variety



PARALLEL SOFTWARE  
on MANY SERVERS



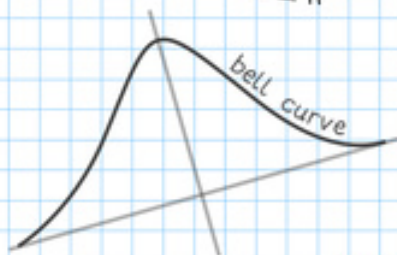
CAPTURE ☒  
CURATE ☒  
MANAGE ☒  
PROCESS ☒

# BIG DATA

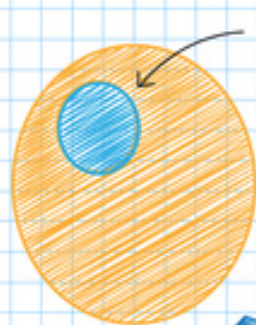


## PREDICTIVE ANALYTICS

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$



Large  
data  
set



sample

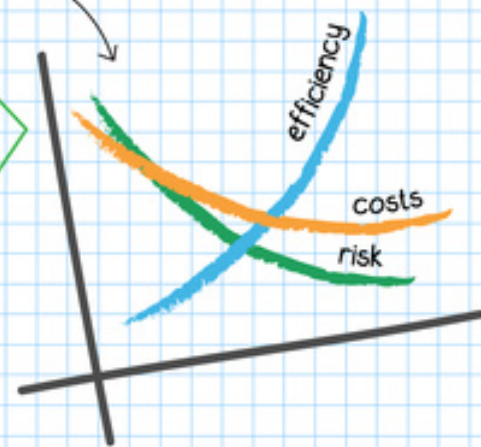


ACCURACY

BETTER DECISION-MAKING

That way

This way



and INDUCTIVE STATISTICS lead to

## The problem:

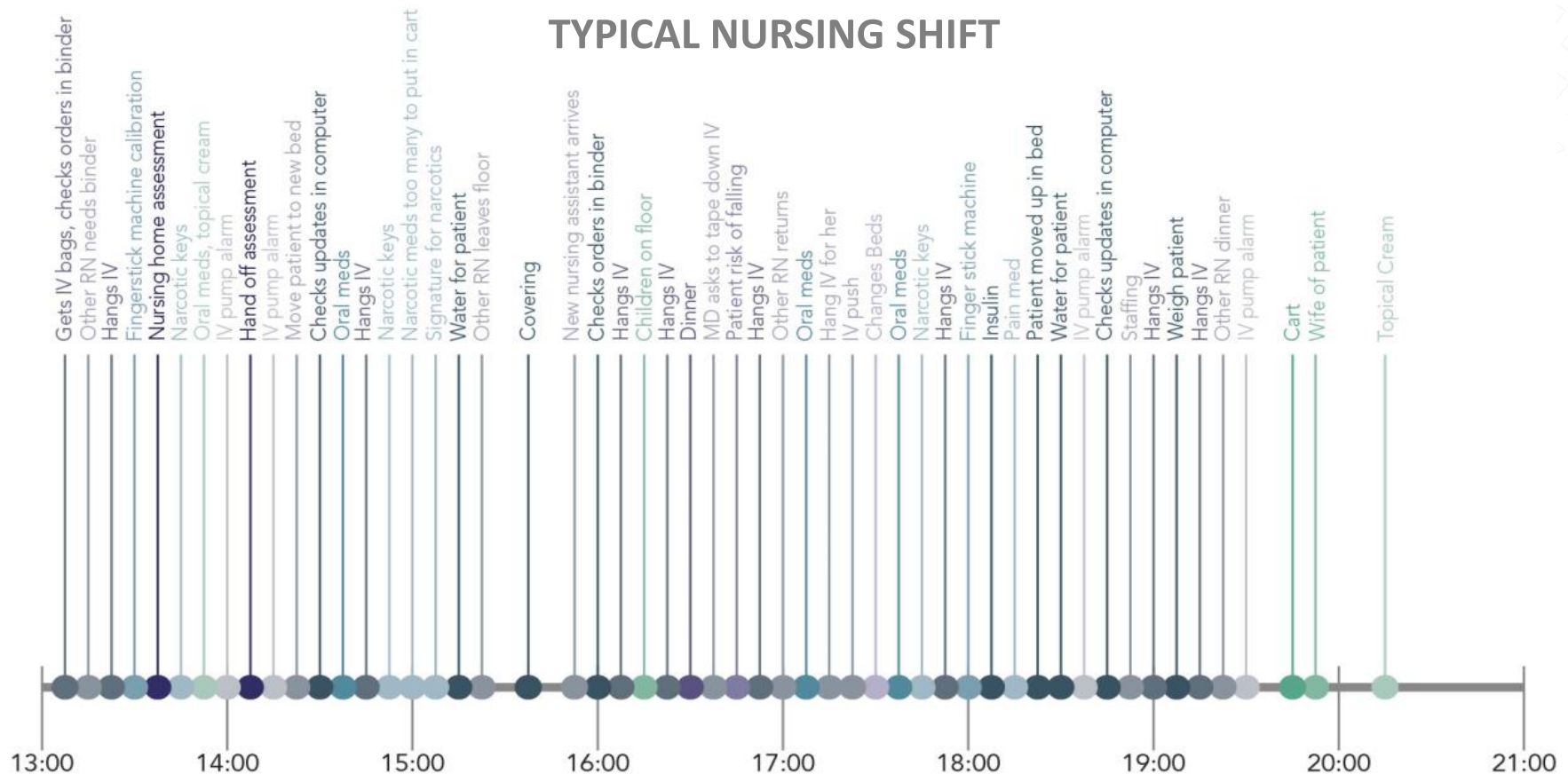
Retrospective data  
manipulation...

...a world of dashboards  
to interpret





# ...and interpreting dashboards isn't part of daily workflow!



# The challenge is about execution and sustainment

- To impact the individual patient and family
- Precision execution of what we already know (or can know) must be executed reliably and repeatedly- **Every Patient, Every Time**
- Systematically marshal and shepherd
  - The people
  - The process
  - The technologies
  - Across multiple care venues in the continuum
  - Across multiple organizations in the system
- This is a workflow issue, not just a data issue
- Optimizing what we do and how we do it, then automating it **is the solution**



# The needed patient and financial data is everywhere

- Typical large system CIN / ACO has to integrate with over 40 applications/EMRs
- Financial impact is usually not known in near-real time at the point of care
- To change outcomes and behavior the solution must bring it all together



# Baptist Health South Florida

- Achieved distinctions in clinical care
- Strong reputation with great outcomes
- Desire to enhance care delivery - order sets and clinical checklists were not enough
- Seeking a partner in data extraction and analytics from a variety of sources



# What Baptist Health South Florida was seeking

- Transition to value based care
  - Need more than dashboard reporting
  - Incorporating clinical care redesign
  - Seeking control on unnecessary clinical variation
- Cost reductions and better use of internal resources
- Better, higher quality patient care
- A solution that works now (FFS) and later (when/if VBP proceeds in earnest)
- Credible partners, not uncertainty of ownership or more siloed applications



# Engaged the BHSF Clinicians, Leidos, Navigant



Clinicians provide the desired care redesign and desired clinical workflow

- Ongoing quality oversight
- Review metrics
- Data analytics about efficacy
- Data analytics about cost and quality performance
- Control changes to the workflow



CareC2 application and information technology support

- Real time data ingestion from multiple existing systems
- Analytics workbench and reporting
- Clinical workflow enablement
- User experience

Scalable, proven solution



Care redesign consultative services

Clinical governance setup and enablement

Analytic support

Change management: People, Process and Metrics that Matter

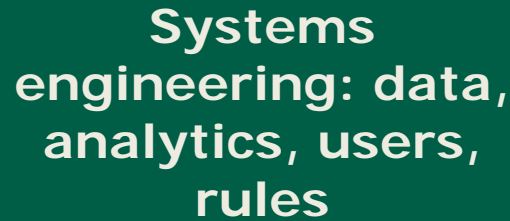




# Evidence Based Care Committee



## Workflow redesign on paper



## Workflow in an application

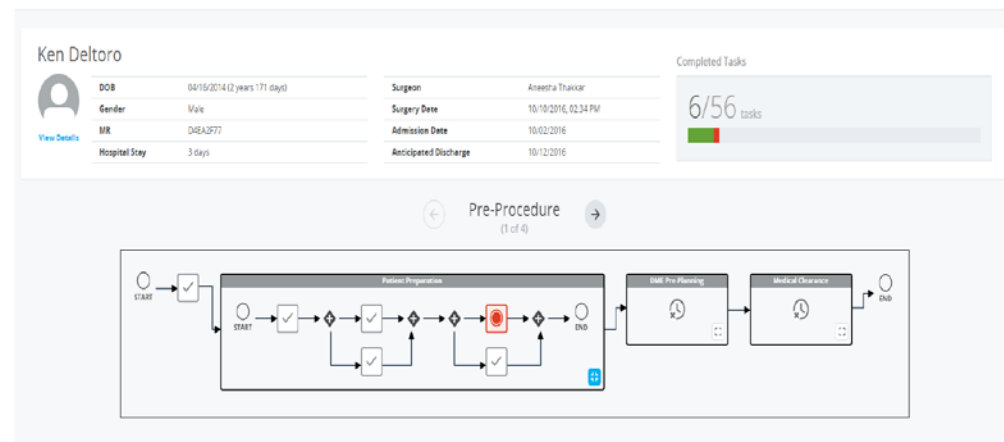
The screenshot displays the 'leidos' Work Flow software interface. The top navigation bar includes 'Work Flow', 'Tools', 'Create Case Coordinator', and 'Create Doctor'. On the left, a vertical toolbar contains icons for various functions: a home icon, a search icon, a plus icon, a minus icon, a magnifying glass, a circle, a diamond, a square, a document, a folder, and a trash can. The main workspace shows a complex process flow diagram. The flow starts with an input 'a' leading into a series of interconnected boxes and decision points. The diagram is organized into several horizontal sections, each containing multiple parallel paths that converge and diverge. The boxes within the flow represent different tasks or steps, and the lines represent the sequence of the process. The overall layout is clean and professional, typical of a business process management tool.

# Pathways

**careC2™**  
INTEGRATION • ANALYTICS • ACTION

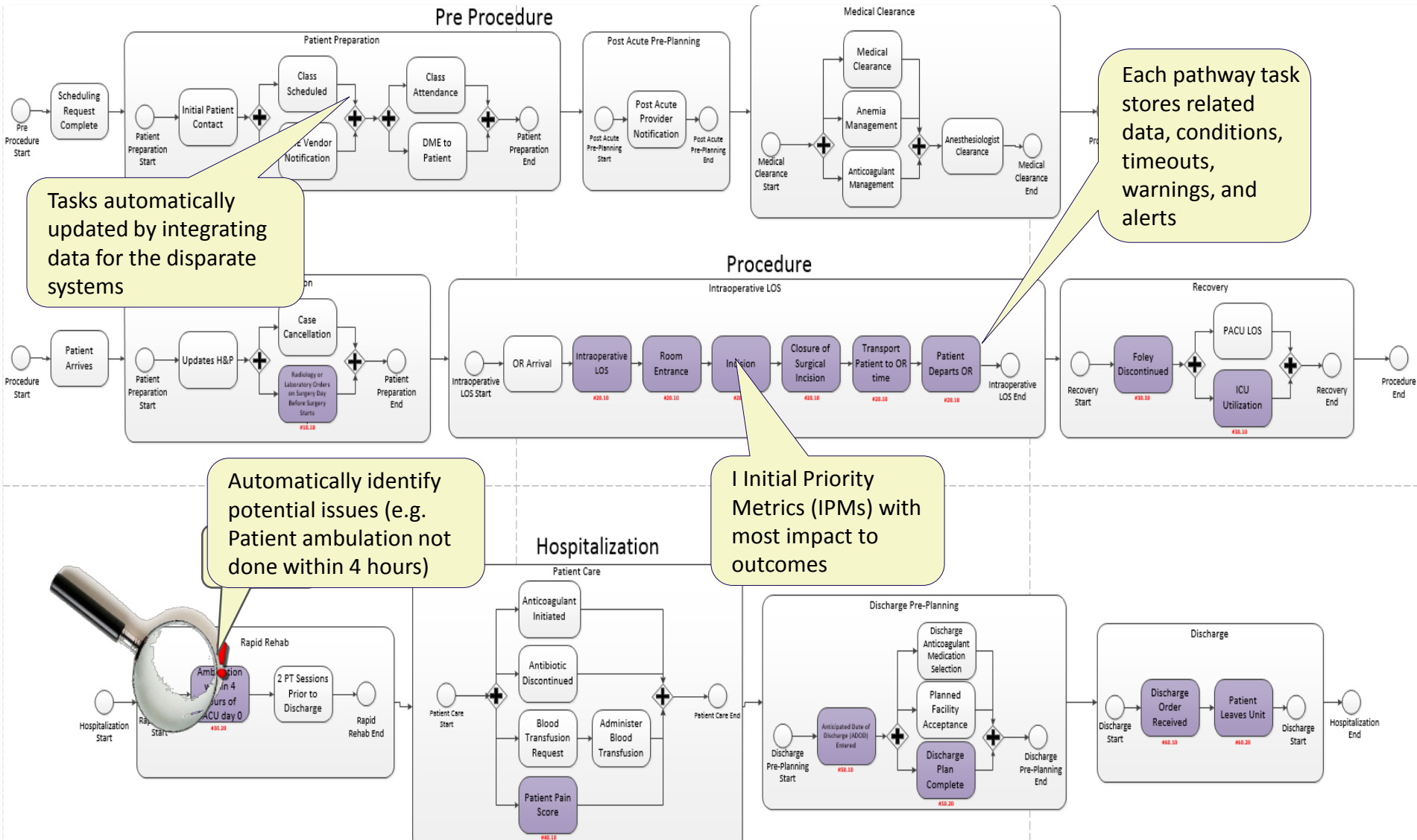


Completion Risk	Workflow	Stage	Procedure	Physician Search
<input checked="" type="checkbox"/> Normal <input checked="" type="checkbox"/> Elevated <input checked="" type="checkbox"/> High	<input checked="" type="checkbox"/> Enrolled 1 <input checked="" type="checkbox"/> Enrolled 2 <input checked="" type="checkbox"/> Enrolled 3	Comprehensive Joint Replacement	All	Start typing...
Search...				
Patient	Procedure	Physician	Current Stage	Active Tasks
Paul Simon	ACL Reconstruction	Walter White	Pre-Procedure	Due in 21 hours Class Scheduled
Sandy Jones	Knee Replacement	Walter White	Pre-Procedure	Due 5 hours ago Class Scheduled
Marty Allen	Knee Replacement	John Smith	Procedure	Due in 17 hours Class Cancellation
Dylan Blatt	Arthroscopic Surgery	Kenneth Fieldings	Pre-Procedure	Due in 17 hours Post Acute Provider...
Brian Morris	Shoulder Replacement	John Smith	Procedure	Due in a day Room Entrance
Garnett Brown	Shoulder Replacement	John Smith	Hospitalization	Due 8 days ago Discharge Anticipated...
Maura Stolle	Hip Replacement	Billy Varian	Procedure	Due in 21 hours Incision
Ken Deltoro	Shoulder Replacement	Anneesa Thakkar	Pre-Procedure	Due 17 hours ago Class Attendance





**Baptist Health South Florida**

# Clinical Pathway (for a DRG or Bundle)



# Real time task lists useable in the daily workflow

<div> Dashboard Care Pathways <b>Tasks</b> Patients Scorecards</div> <div> 6</div> <div>Hello, Frances</div>						
Tasks <div>Today's TasksActive TasksCompleted Tasks</div>						
<div><input type="text" value="Search..."/></div> <div>Legend</div>						
Task	Description	Status	Doctor	Patient	Due Date	Alerts
Room Entrance	Confirm the Room Entrance for Brian Morris by 12/12/2016 11:11 AM	3	John Smith	Brian Morris	12/12/2016 11:11 am	1
Pharmacist Medication Reconciliation	Confirm the Pharmacist Medication Reconciliation for Ken Deltoro by 12/12/2016 03:57 AM	3	Aneesha Thakkar	Ken Deltoro	12/12/2016 03:57 am	1
Evening RN Ambulation	Confirm the Evening RN Ambulation for Matthew James by 12/12/2016 06:03 PM	2	John Smith	Matthew James	12/12/2016 06:03 pm	1
Same Day Lab Testing	Confirm the Same Day Lab Testing for Marty Allen by 12/12/2016 07:56 PM	1	John Smith	Marty Allen	12/12/2016 07:56 pm	1
DME Vendor Notification	Confirm the DME Vendor Notification for Sandy Jones by 12/13/2016 04:02 AM		Walter White	Sandy Jones	12/13/2016 04:02 am	1
Class Attendance	Confirm the Class Attendance for John Church by 12/13/2016 11:56 AM		Walter White	John Church	12/13/2016 11:56 am	1
Pharmacist Medication Reconciliation	Confirm the Pharmacist Medication Reconciliation for Garrett Brown by 12/14/2016 02:55 AM		John Smith	Garrett Brown	12/14/2016 02:55 am	
Foley Discontinued	Confirm the Foley Discontinued for Marshall Thurman by 12/13/2016 08:02 PM		Ripley Burroughs	Marshall Thurman	12/13/2016 08:02 pm	
DME Vendor Notification	Confirm the DME Vendor Notification for Paul Simon by 12/13/2016 08:35 PM		Walter White	Paul Simon	12/13/2016 08:35 pm	
Pharmacist Medication Reconciliation	Confirm the Pharmacist Medication Reconciliation for Maura Stolle by 12/13/2016 11:42 PM		Billy Vahlen	Maura Stolle	12/13/2016 11:42 pm	
Incision	Confirm the Incision for Lindsay Sorkin by 12/13/2016 08:02 PM		Jorge Garcia	Lindsay Sorkin	12/13/2016 08:02 pm	

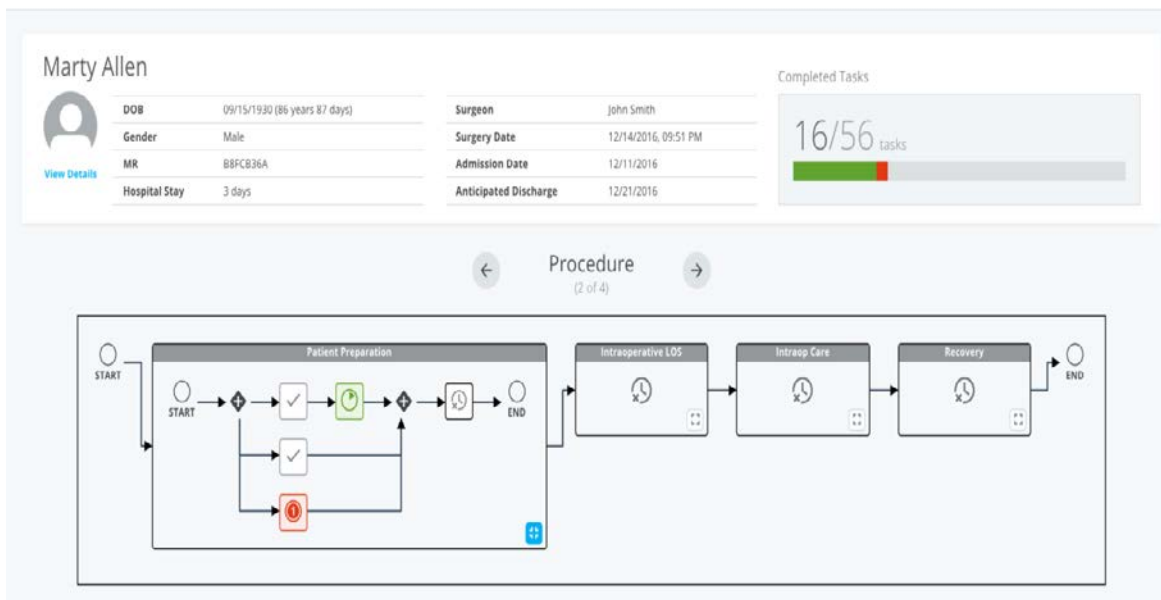
leidos Dashboard Care Pathways Tasks Patients Scorecards

Search... View Legend

Patient	Procedure	Physician	Current State	Active Tasks
Rachel Adams	Rotator Cuff Repair	John Smith	Complete	
Ken Deltoro	ACL Reconstruction	Aneesha Thakkar	Hospitalization	Due 2 days ago Pharmacist Medicati...
Dylan Blott	Spine Surgery	Kenneth Fieldings	Pre-Procedure	Due 5 hours ago Anesthesiologist Cle...
Akira Nishimoto	Hip Replacement	Alfred Stewart	Procedure	Due 8 hours ago PreOp Nerve Block P...
Marty Allen	Hip Replacement	John Smith	Procedure	Due 2 days ago Same Day Lab Testing Due a day ago Adductor Canal Loca...
Paul Simon	Rotator Cuff Repair	Walter White	Pre-Procedure	Due 12 hours ago DME Vendor Notifica...
Hannah Silberman	Arthroscopic Surgery	Kevin Williams	Hospitalization	Due 12 hours ago Inpatient Order Set ...
Sandy Jones	ACL Reconstruction	Walter White	Pre-Procedure	Due a day ago DME Vendor Notifica...

1 2 3 1 of 3

Real time  
metrics  
available to  
the care  
providers





careC2

Dashboard
Episode Costs
Conditions
Risk Score Index
**Patients**

Hello, Admin

Mabel Jones
Congestive Heart Failure
DOB: 01/25/1942 (72)
Code Status: Full Code

**Active Patient**
Room: Med/Surg 3 North - 303
Stage: Initial Treatment
Procedure: Pending Consultation

Primary Care Physician: Cynthia Wilson
Phone: 1-101-010-1010
Admission: 12/12/2016
[Discharge Plan](#)

Care Need Index **5.00**

Predictive Score **1.36**

Arrange Transport

Dashboard
Pathways
Care Plan
Patient Risk

Overdue Tasks

Schedule Appointment for Joe Marino  
Due in 5 hours

Medication Refill for Mabel Jones  
Due in 8 hours

Weekly Call for George Davidson  
Due in 10 hours

Weekly Call for Linda Wilson  
Due in 10 hours

Vital Signs

HR Weight Glucose Temp Steps

Active Medications

Scheduled Antibiotics PRNs IVs

Medication	Dosage	Frequency
Aspirin	325 mg	daily
Furosemide	20 mg	daily
Lisinopril	20 mg	daily
Carvedilol CR	20 mg	2x daily
Losartan	50 mg	daily
Combivent Inhaler	1 puff	3x daily
Fluticasone Inhaler	1 puff	2x daily

Notes

Rounding Progress Admission

Last Updated 12/19 by Walter White

Patient experiencing nausea upon starting daily dosage of aspirin

Patient still experiencing trouble sleeping

Last Updated 12/18 by Walter White

Patient experiencing trouble sleeping after beginning medication. Opted to wait and see if it was just stress

Ordered another pillow to make more comfortable

Patient Calendar - Mabel Jones

April 2017

Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Active Problem List

Congestive Heart Failure  
Chronic Obstructive Pulmonary Disease  
Diabetes Type II  
Hypertension  
Coronary Artery Disease  
Degenerative Joint Disease  
Comprehensive Joint Replacement  
Right Hip  
Tobacco Use

Lab Values

Historic View

12/18	10/1	12	25/7
124	101	12	257
3.7	25	2.7	

Images

CT Scan

10/24/2016 10:46 AM

Orders

Chest CT without contrast  
Ordered: 12/14/2016 09:02 AM

Infectious Disease Consult  
Ordered: 12/14/2016 12:55 PM

Patient Quality Measures

Hospital Q&S ACO Data National Q&R

Congestive Heart Failure: Echocardiogram

Hypertension: Improvement in Blood Pressure

Diabetes: Foot Exam

Diabetes: Eye Exam

Coronary Artery Disease (CAD): Antiplatelet Therapy

Consulting Providers

Walter White, MD

Cardiologist • 703-244-4443

Billy Vahlen, MD

Orthopedist • 703-555-5555

Carla Espinoza, MD

Endocrinologist • 703-888-8888

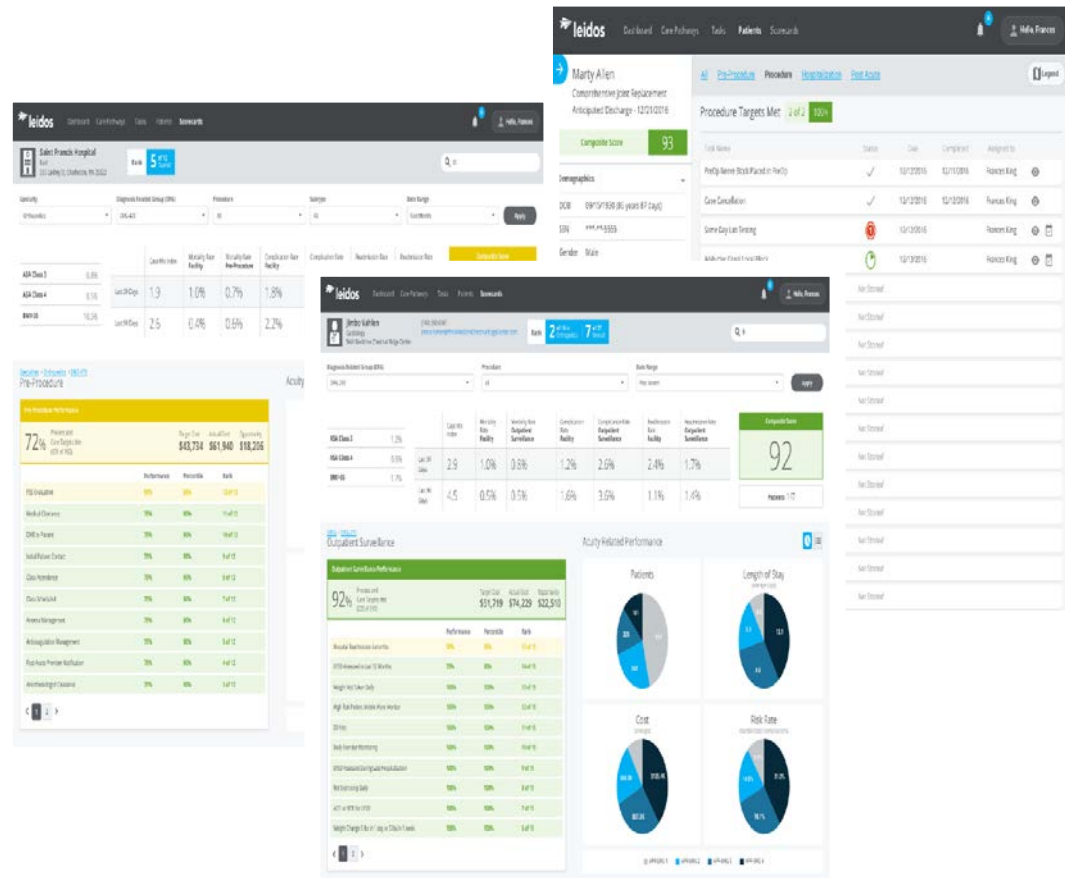
“One Screen”  
including Ambulatory  
and Post-Acute  
Monitoring (next phase)

27

# Scorecards



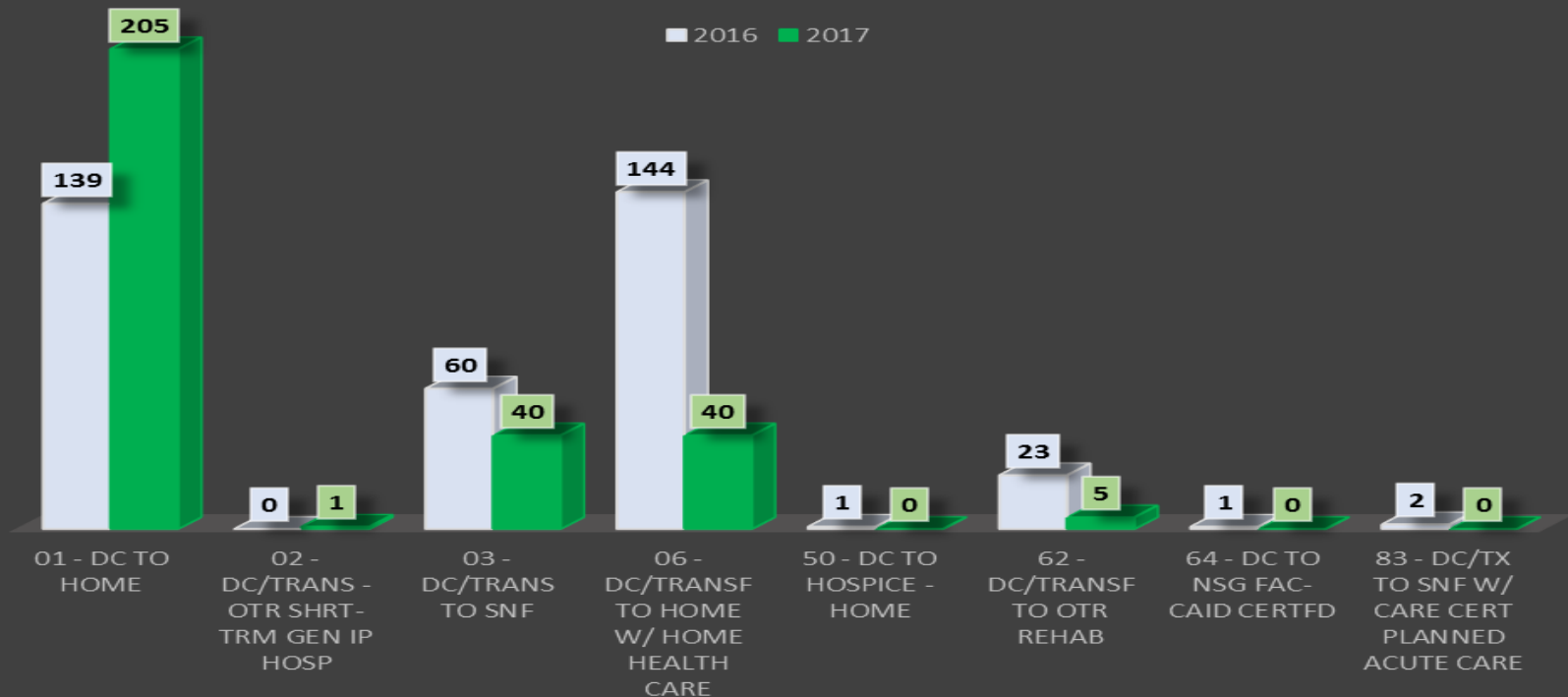
- Assess performance and guide next steps
  - Care redesign
  - Quality
  - Costs
- Enterprise level
- Individual level



# Reducing total cost of care, with no discernable change in readmissions

Source: BHSF ProDiver CY 2016-  
August 2017

BHSF DISCHARGE DISPOSITION  
POST-ACUTE CARE  
APR DRGS 301 HIP & 302 KNEE REPLACEMENT  
CY 2016 VS MTD AUGUST 2017



# Clinical Impact - Disposition

Discharge to  
home with no  
services

47%

Discharge to  
SNF

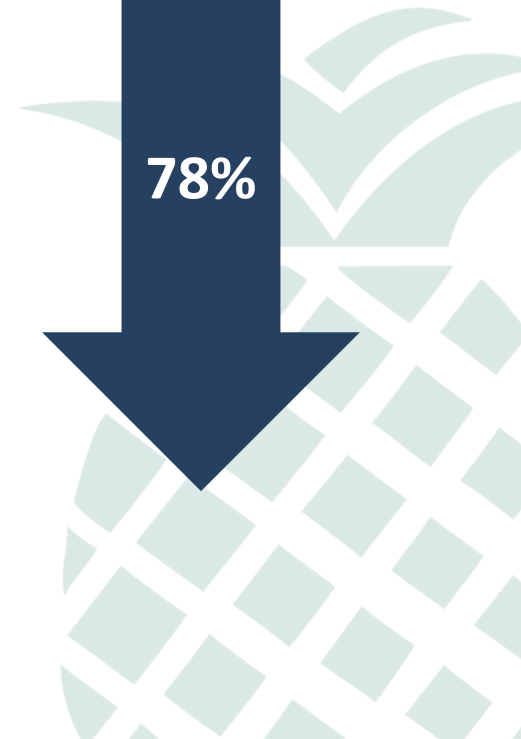
33%

Discharge to  
home with  
Home Health

72%

Discharge to  
Rehab facility

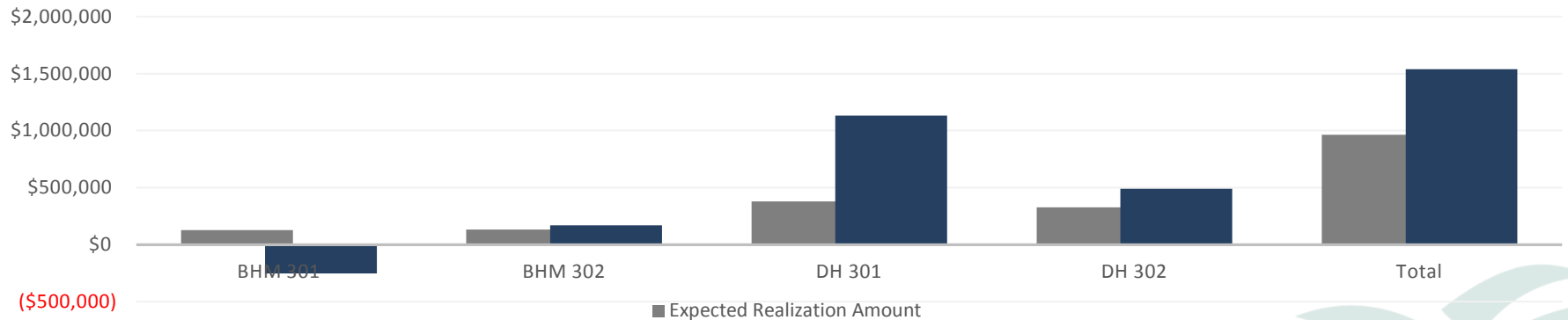
78%



# DRG Redesign: actual realization to date

## APR-DRG 301 & 302

Fiscal Year 2017



Facility	APR-DRG	Deployment Date	Inflated Baseline Cost Per Case	Avg. CPC Since Implementation	Variance	Cases Since Implementation	Actual Realized Amount	Less: Adjustment for Corp. Services	FY 17 Adjusted Actual Realization	Expected Realization Amount	Projected FY 17 Actual Realization (full year)
BHM	301	Feb-17	\$23,802	\$25,374	\$1,572	122	(\$191,750)	(\$61,436)	(\$253,196)	\$126,852	(\$607,671)
BHM	302	Feb-17	\$20,551	\$19,301	(\$1,249)	229	\$286,052	(\$115,318)	\$170,769	\$131,894	\$409,845
DH	301	Oct-16	\$27,618	\$22,570	(\$5,049)	249	\$1,257,126	(\$125,390)	\$1,131,695	\$378,455	\$1,508,927
DH	302	Oct-16	\$24,762	\$21,869	(\$2,894)	205	\$593,201	(\$103,233)	\$490,012	\$326,759	\$653,350
Total						805	\$1,944,629	(\$405,376)	\$1,539,280	\$963,960	\$1,964,450

1). Expected realization calculated from HCUP opportunities trended over time using deployment dates updated through 8.6.17

2). 3% inflation applied yearly to baseline cost per case to account for increase in medical market costs.

3). Actual realization dollars from BITS tool based on BHSF billing and claims data.

4). Revenue Neutrality Adjustment for Per Diem payors not completed

# What we learned

- The information is everywhere....but it's not integrated into a practical use at point of care
- It's not about the next cool "product".... it's about complex systems integration
- It's not about Big Data....it's about Little Data and Big Workflow
- It's not about technology... it's about people and process
- It's not about inventing new ways to practice medicine... it's about practicing with precision





# What is next?

- Adding clinical conditions
  - Hip Fracture
  - Congestive Heart Failure (CHF)
  - Sepsis
  - Spine procedures
  - Deliveries
    - Vaginal
    - Cesarean section
- Command center modeling
- Measuring and refining the clinical and financial outcomes
- Translate concepts to value-based contracts



# Neils Bohr

“Prediction is very difficult, especially about the future.”

- As quoted in *Teaching and Learning Elementary Social Studies* (1970) by Arthur K. Ellis, p. 431

“We are all agreed that your theory is crazy.

The question that divides us is whether it is crazy enough to have a chance of being correct.”

- Said to [Wolfgang Pauli](#) after his presentation of [Heisenberg](#)'s and Pauli's nonlinear field theory of elementary particles, at Columbia University (1958), as reported by [F. J. Dyson](#) in his paper “Innovation in Physics” (*Scientific American*, 199, No. 3, September 1958, pp. 74-82; reprinted in “JingShin Theoretical Physics Symposium in Honor of Professor Ta-You Wu,” edited by Jong-Ping Hsu & Leonardo Hsu, Singapore; River Edge, NJ: World Scientific, 1998, pp. 73-90, here: p. 84).

[https://en.wikiquote.org/wiki/Niels\\_Bohr](https://en.wikiquote.org/wiki/Niels_Bohr)



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<https://images1.westword.com/imager/gene-sobczak-returns-to-head-the-colorado/u/original/6495484/orchestra7460293.28.jpg>



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