

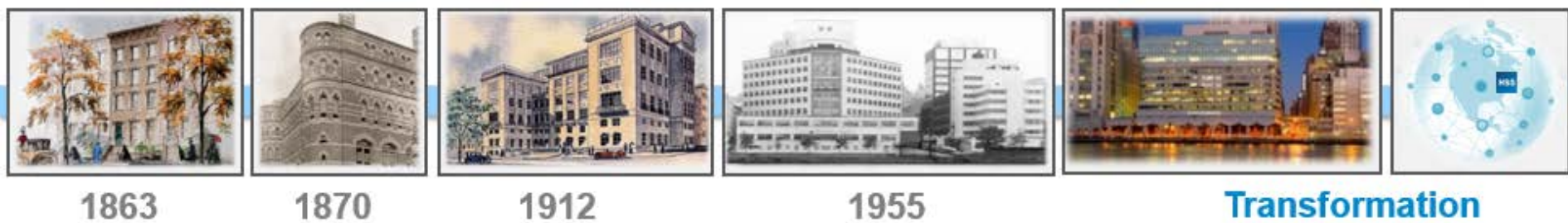
The HSS logo consists of the letters 'HSS' in a bold, white, sans-serif font, centered within a solid blue square. This square is part of a larger graphic element made of a grid of light blue squares of varying opacity, which fades out towards the right and bottom of the slide.

HSS

2018 Nicolas E. Davies Enterprise Award of Excellence

HSS Overview

A Legacy of Musculoskeletal Leadership



Mission

Provide the **highest quality patient care**, **improve mobility**, and **enhance the quality of life for all**, and to advance the science of orthopedic surgery, rheumatology, and their related disciplines through research and education.

Vision

Lead the world as the **most innovative source of medical care**, the **premier research institution**, and the **most trusted educator** in the field of orthopedics, rheumatology, and their related disciplines.

Values

Excellence. We set and continually raise the bar on all that we do. **Integrity.** We take pride in maintaining the highest levels of personal and professional conduct. **Teamwork.** We participate fully as members of our team, respecting, supporting, and empowering one another. **Creativity.** We support an environment that fosters new ideas and new approaches in everything we do. **Passion.** We bring energy, commitment, and enthusiasm to our work everyday

World Class Talent Singularly Focused on Musculoskeletal Care

Dedicated Interdisciplinary Team

~230 Orthopedic faculty, fellows, and residents specialized across 10 service lines

~250 Physicians in related medical specialties:

- Rheumatologists
- Perioperative Medicine
- Radiology
- Physiatry
- Pain Management
- Primary Care Sports Medicine
- Anesthesiology
- ID, Neurology, Cardiology

1,000+ PAs, NPs, RNs and PTs also specialized according to service lines

Cross-Continuum Care

Operative Care

Non-Operative Care

Rehabilitation

Research and Innovation

Education and Academic Affairs

Diagnostics and Imaging



Singular Focus on Musculoskeletal Medicine

Orthopedics

- Adult Reconstruction & Joint Replacement
- Foot & Ankle
- Hand & Upper Extremity
- Hip Preservation
- Limb Lengthening
- Metabolic Bone Disease
- Pediatrics
- Spine
- Sports
- Trauma

Rheumatology

- Inflammatory Arthritis
- Lupus
- Osteoarthritis
- Osteoporosis
- Pediatric Rheumatology
- Scleroderma, Vasculitis, Myositis

Related Disciplines

- Anesthesiology
- Infectious Disease
- Neurology
- Pain Management
- Pathology & Laboratory Medicine
- Physiatry
- Radiology & Imaging
- Rehabilitation



2017 Performance

Leadership



#1 in Orthopedics

#3 in Rheumatology

#1 Orthopedic Residency Program

Value

99thile

Likelihood to Recommend

38th consecutive quarter

Fewer Complications

HSS 1.9%

National Average 2.8%

36% Non-Operative Second Opinion

Growth

32,500+
Surgical Cases

413,000+
Outpatient Visits

New Locations



130 Invention Submissions
30 Patents Filed

Financial Health

\$1.4B
Total Revenue

6.7%
Margin

\$29M
Philanthropic Contributions

\$66M
Grant Support

Patients from All 50 States and 100+ Countries* Choose HSS

>150K

Patients Cared For

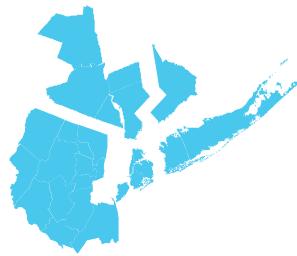
~32K

Surgeries Performed



New York City

36%



Tri-State Area

51%



Domestic

11%



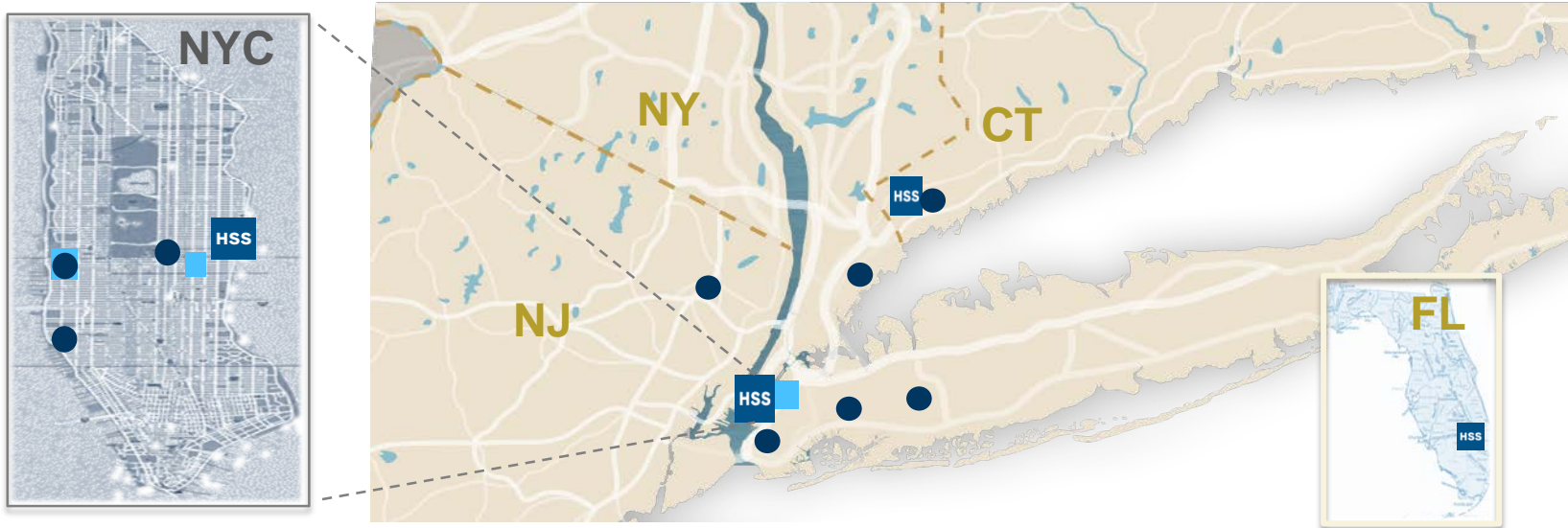
International

2%

Source: 2017 HSS IP & AMS surgical volume
Percentages are of surgical volume
*Over 3 years



An Extensive and Growing Delivery System



HSS Main Campus
Upper East Side, Manhattan, NY

- Main Hospital with 39 ORs, 215 beds
- Research Institute, Education Institute, Innovation Institute, other leading facilities



Planning 2025
 Main Campus Transformation

HSS Stamford Campus
 Stamford, CT
 HSS Stamford Health
 Collaboration

HSS Florida Campus
 West Palm
 Beach, FL
(2019)

Ambulatory Surgery Centers
 Upper East Side, Manhattan, NY
 West Side, Manhattan, NY *(2019)*

Employer Programs
 Include onsite services and other offerings to deliver greater value and more accessible care

Rehab Network
 Affiliated network of rehab centers to facilitate episode of care management

Outpatient Centers

| | | | |
|------------------|---|---|---|
| | <i>Madison Ave.</i> | <i>West Side*</i> | <i>Hudson Yards*</i> |
| MANHATTAN |  |  |  |
| | <i>Long Island</i> | <i>Queens</i> | <i>Brooklyn*</i> |
| NYC METRO |  |  |  |
| | <i>Paramus, NJ</i> | <i>Westchester, NY</i> | <i>Stamford, CT</i> |
| |  |  |  |

**anticipated 2019*

Extending Value Proposition Beyond NYC



HSS

GLOBAL
VENTURES

Engaging in advisory relationships, management service arrangements, and operating partnerships to create a **global network of leading orthopedic providers** who bring HSS's cutting edge knowledge to the world

Global Ventures Examples

Academic Collaborations



HSS-China
Orthopaedic
Education Exchange



ΙΣΝ / SNF

ΙΔΡΥΜΑ ΣΤΑΥΡΟΣ ΝΙΑΡΧΟΣ
STAVROS NIARCHOS
FOUNDATION

Advisory Services



United Brazil

Hospital Medical Services



Hospital
Alvorada



BUMIN
HOSPITAL
GROUP

Management Services & Collaborations

HSS Connecticut

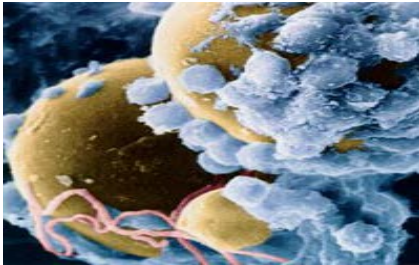
HSS Florida

Robust Pipeline



HSS

Cutting-Edge Research Advances Knowledge and Care



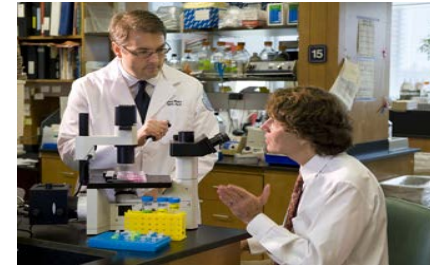
Bone Health

Making bones stronger



Autoimmunity & Inflammation

Improving the immune system



Soft Tissue & Spine Regeneration

Helping the body to heal itself

Genomics

Interpreting the body's blueprint

Precision Medicine

Studying disease mechanisms to personalize treatment for each patient

Healthcare Research Institute

Using historical data to improve future of patient care

Biomechanics

Engineering advances in orthopedics

MRI Research

Diagnosing patients less invasively and more accurately

**\$42MM 2017 EXPENDITURES | \$66M GRANT SUPPORT | 300+ SCIENTIFIC STAFF
47 REGISTRIES**

HSS

Extending Leadership Through Education



Engaged **99,450** individuals in educational programs in 2017



State-of-the art training and simulations using **Bioskills Education Laboratory**



Hosted **427** academic visitors from around the world in 2017



Improvements in **population health** through targeted programs in the community



Affiliated with **Weill Cornell Medical College**



600+ professional education **HSS eAcademy** online modules and onsite courses



Leading Results

RECOGNITION



#1 in Orthopedics
#3 in Rheumatology



#1 Orthopedic Residency for 3rd year in a row

CULTURE



7 to 1 ratio of engaged to disengaged employees based on Gallup Employee Engagement Score



1st in NYS to receive **4** consecutive Magnet Nursing designations

QUALITY



7 consecutive years of hip replacement infection rates lower than NY state average



Ranked as a **5 Star** hospital for Spine Surgery



The Official U.S. Government Site for Medicare
Hip/Knee all cause readmissions **31%** better than national average



#1 in Nation for Joint Replacement, and in NY State for Spine Surgery



Only hospital rated 5 stars in NY State

PATIENT SATISFACTION



5th consecutive **Guardian of Excellence Award**



99th 'Likelihood to Recommend' for 38 consecutive quarters among Magnet hospitals

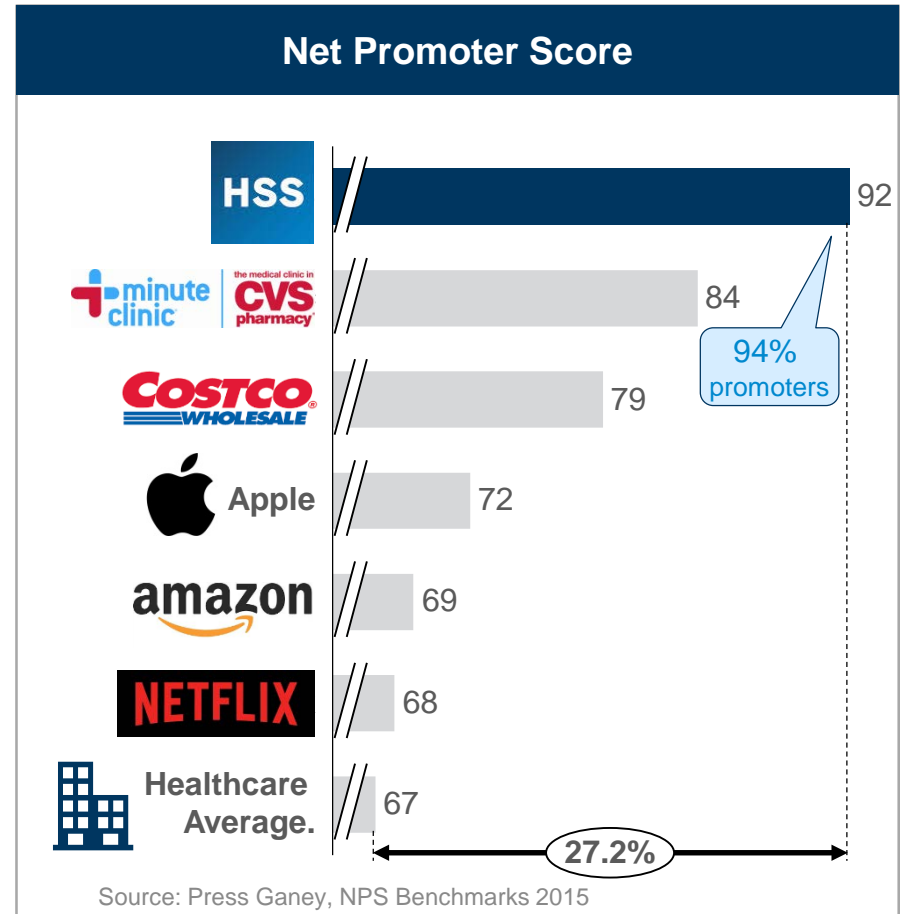
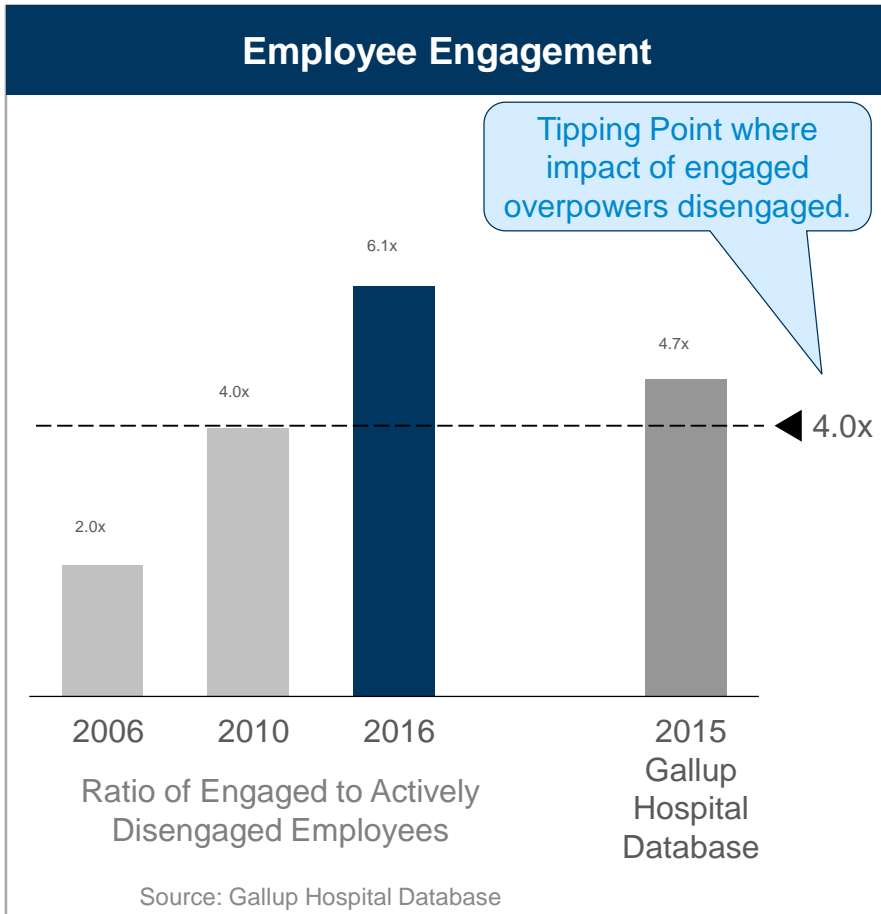


94%

Net Promoter Score vs. 67% Healthcare Average



Power of Culture



Actively Engaged Employees contribute to an industry leading Net Promoter Score, a measure of customer/patient satisfaction



Strategic Roadmap to 2020

HSS

Patient-Centered and Culture – Foundation for Current and Future Success

Journey

Better

Bigger isn't better. Better is better.

A comprehensive plan for our better to succeed against others' bigger. Our better includes being bigger, but while maintaining our independence and leveraging our strengths



Knowledge



Focused Factory

Produces superior outcomes from our specialization, high volumes & repeatable processes; serves as our economic foundation

Knowledge Factory

Leverages and spreads our expertise to reinforce our leadership, broaden what we do; becomes an important part of our economic foundation

Scale

Achieve 'focused scale' in Musculoskeletal Health

HSS's commitment to care delivery, research, innovation and education will extend its reach and impact through new musculoskeletal products and services, while serving a global market



Capabilities

Shared Leadership

Enabling everyone at HSS to work towards the same goals and take responsibility for the collective success of the organization



New Ideas

Launching and commercializing novel solutions that improve care and fuel our "Knowledge Factory"



New Alignment

Providing the structure and environment that allow important stakeholders to pursue new opportunities, providing economic and strategic alignment



Initiatives

Initiatives will vary from year to year but will continue to support our key strategies.

- Value Proposition
- Alignment
- Efficiency
- Growth

Select Initiatives

- Epic Transformation
- HS²
- HSS Orthopedics
- Innovation Center
- Main Campus Development
- New Care Delivery Models
- Regional & New Market Expansion
- Value Proposition

Enterprise Success

Leadership

Distinction in reputation, rankings and academics



Value

Top performance in quality, outcome and value measures over episode of care



Growth

Growth across markets and through knowledge-based initiatives



Financial Health








Robust financial health for ongoing success of the organization



PATHWAY TO SUSTAINED LEADERSHIP IN MUSCULOSKELETAL HEALTH

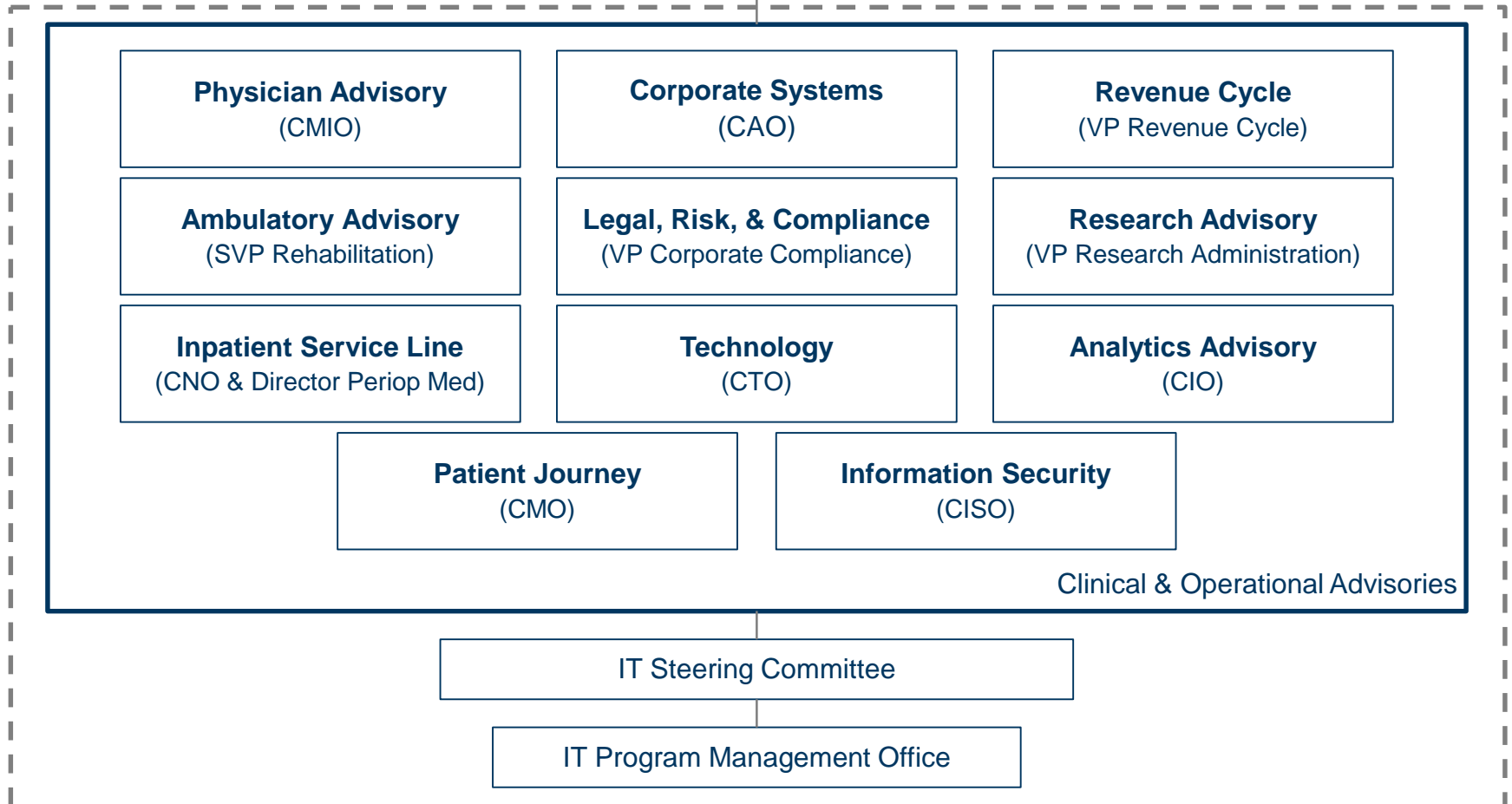
Foundation: Patients | Research | Education | Community | Culture

Technology Roadmap to 2020

-  **Build Strong Technology Foundations** enabling cost-effective, standardized and agile delivery of services (Core IT).
-  **Establish an Information Security Program** with dedicated leadership, active executive team engagement, management of third-party relationships and increased patient confidence in security protections (Risk).
-  **Develop Enterprise-Level Business Intelligence and Data Analytics** capabilities enabling new discovery, innovation and value (Knowledge).
-  **Define a Patient Experience Strategy** essential for sustaining market position, enhanced care coordination and “Better” (Brand/Value).
-  **Align IT Service Expansion Model** to respond to market growth and pending facility changes to existing campus (Growth).
-  **Evolve the IT Governance Process** for stakeholders seeking broader engagement and shared decision-making (Shared Leadership).
-  **Create New IT Partnerships** supporting Innovation Center, Value Management and Patient Experience initiatives (Alignment).

IT Governance

HSS Executive Leadership

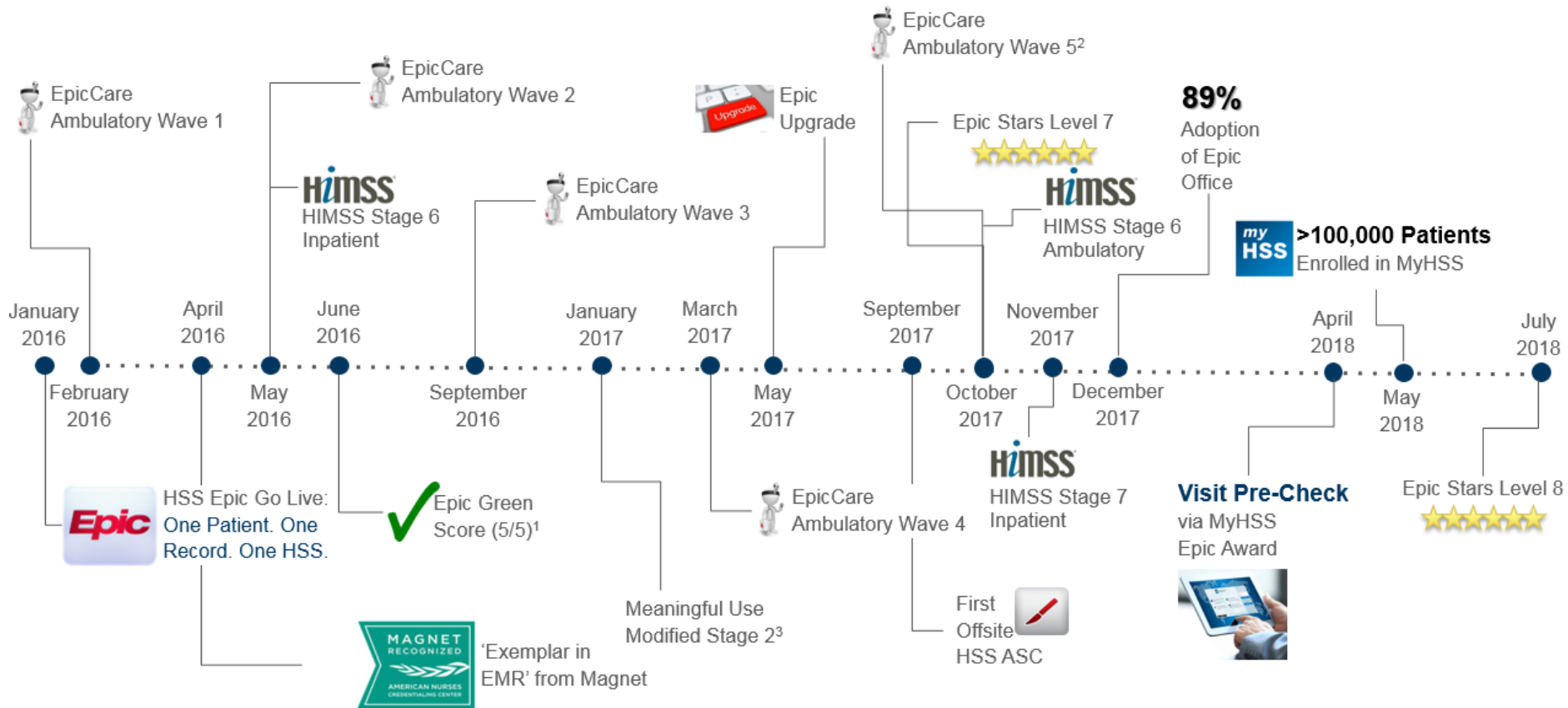


Working Groups for Content Management, Process Modeling, & Application Development

IT Enterprise Overview



EMR Successes



¹Received an 'Excellent' rating from Epic within the first six months of Go-Live, placing HSS in the top 7% of all Epic implementations.

²Added two additional Ambulatory waves at the request of HSS surgeons.

³As of last week, HSS is the 15th client ready to attest for Meaningful Use Stage 3.



2018 Nicolas E. Davies Enterprise Award of Excellence
Case Study: Census Reporting and Clinical Pathway Management
to Improve Capacity and Optimize Patient Care

Dawn Williams
Manager, Patient Access Services

David Rebhan
Director, Operational Excellence

Part I: Reduction of Work Effort for Census Notification

Dawn Williams
Manager, Patient Access Services

The logo for HSS (Hennepin State Hospital) is a blue square with the letters "HSS" in white, bold, sans-serif font. It is positioned in the bottom left corner of the slide, partially overlapping a decorative grid of light blue squares that extends from the left edge of the slide.

HSS

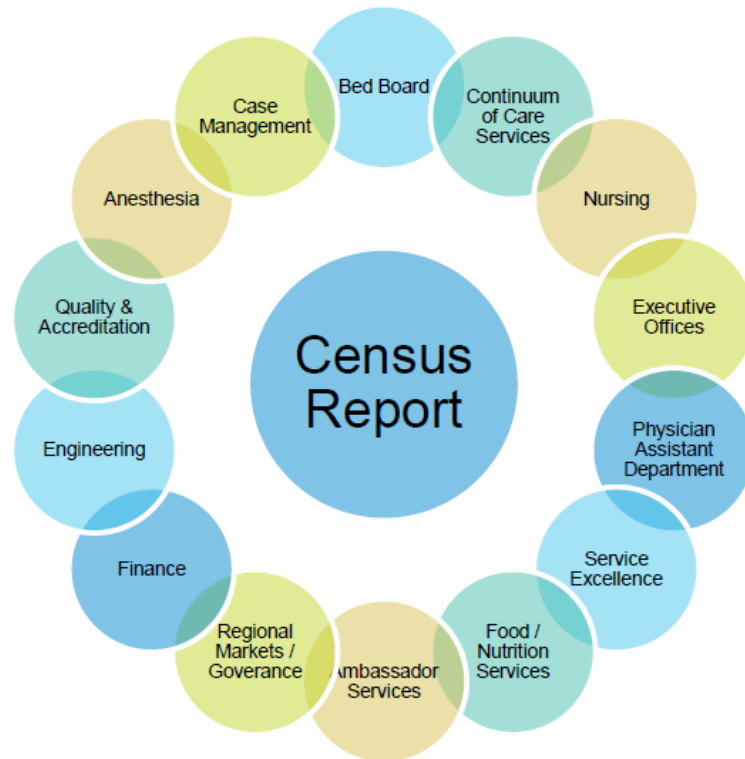
Census Notification Problem Background

- PAS tasked with bed management for more than 18,500 orthopedic inpatient surgeries annually
- Requires close monitoring of bed utilization to accommodate patient volume
- Hospital bed census communicated to HSS leadership and operational owners four times per day
- Manual data collection process presented significant operational challenges
 - Multiple telephone touchpoints with nursing units throughout the day
 - Data often based on subjective estimates
 - Minimal ability to cross-train due to process complexity, resulting in staffing challenges
- After the implementation of our EHR, operational & IT leadership looked for a way to leverage new technology to transform the bed planning process

Challenges with the Prior Process

- Inadequate reporting tools
 - No real time monitoring
 - No ability to reliably track patient throughput
- Critical billing related notes lost after discharge
- Limited visibility of patient's admission details
- Existing platform wasn't user friendly, requiring a lot of manual clicks
- Inability to use indicators or communicate updates to other users
 - Resulted in repeated calls/email among staff members
 - Often resulted in duplicate work

Census Notification Process

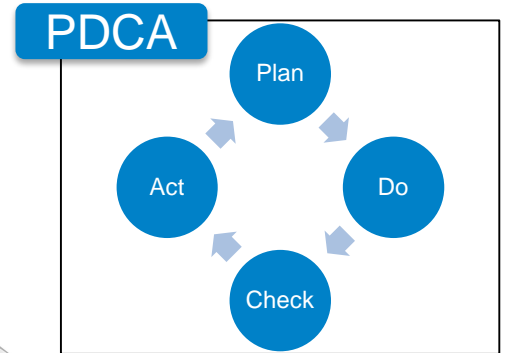


| | 11:30A | 2:30PM | 5:00PM | 9:00PM |
|-----------------------------------|---------------|---------------|---------------|---------------|
| Today's AM Census | 149 | 149 | 149 | 149 |
| Scheduled Admits: | 58 | 58 | 58 | 58 |
| Emergency IP Admits: | 0 | 1 | 1 | 1 |
| AMS Needed Beds | 6 | 9 | 10 | 13 |
| Sleep Apnea: | 0 | 1 | 2 | 2 |
| Expected Census W/O D/C's (EC) | 213 | 218 | 220 | 223 |
| Active Bed Count (BC): 209 | 197 | 196 | 193 | 194 |
| EC-BC | 16 | 22 | 27 | 29 |
| Confirmed Discharges: | 23 | 31 | 38 | 40 |
| PACU Projection | 0 | 0 | 0 | 0 |
| House Census Projection | 190 | 187 | 182 | 183 |
| Pending Discharges | 29 | 16 | 1 | 0 |
| Discharges Already Departed | 0 | 21 | 34 | 38 |
| Notes: | 11:30A | 2:30PM | 5:00PM | 9:00PM |
| Blocked for Clinical Reason | 0 | 0 | 0 | 0 |
| Peds Unused | 6 | 7 | 9 | 8 |
| 11 N Unrequested | 6 | 6 | 7 | 7 |
| Closed for Maintenance | 0 | 0 | 0 | 0 |
| Closed for Special Use | 0 | 0 | 0 | 0 |
| Total Unavailable Beds | 12 | 13 | 16 | 15 |

Goals & Objectives

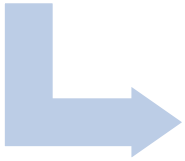
- Deliver an 'At a Glance' view of the entire house
- Implement tools to reduce PACU overnight volume
 - Proactively anticipate capacity volume
 - Develop solutions to accommodate future admissions
- Implement tools to reduce PACU bed turnaround
 - Bed assignment & availability
- Automate daily projected census reporting
- Develop a solution better suited to scale and train across skill sets

Design Methodology



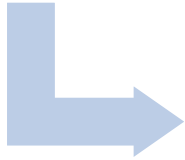
Operational owners, vendor, and IT met to discuss current state workflow and data collection

- Pulled in front-end users
- Talked with end-users about data they provided and how determined
- Scrutinized each data point to understand which we could automate



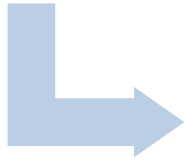
Vendor proposed solutions and guided IT in initial build

- Proposed solutions were reviewed
- Completed build for initial dashboard



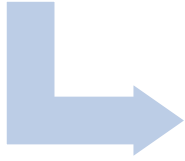
Circulated initial build with stakeholders for buy-in

- Stakeholder review draft dashboard
- Visited each stakeholder individually to understand unique concerns
- Revised build based on stakeholder feedback

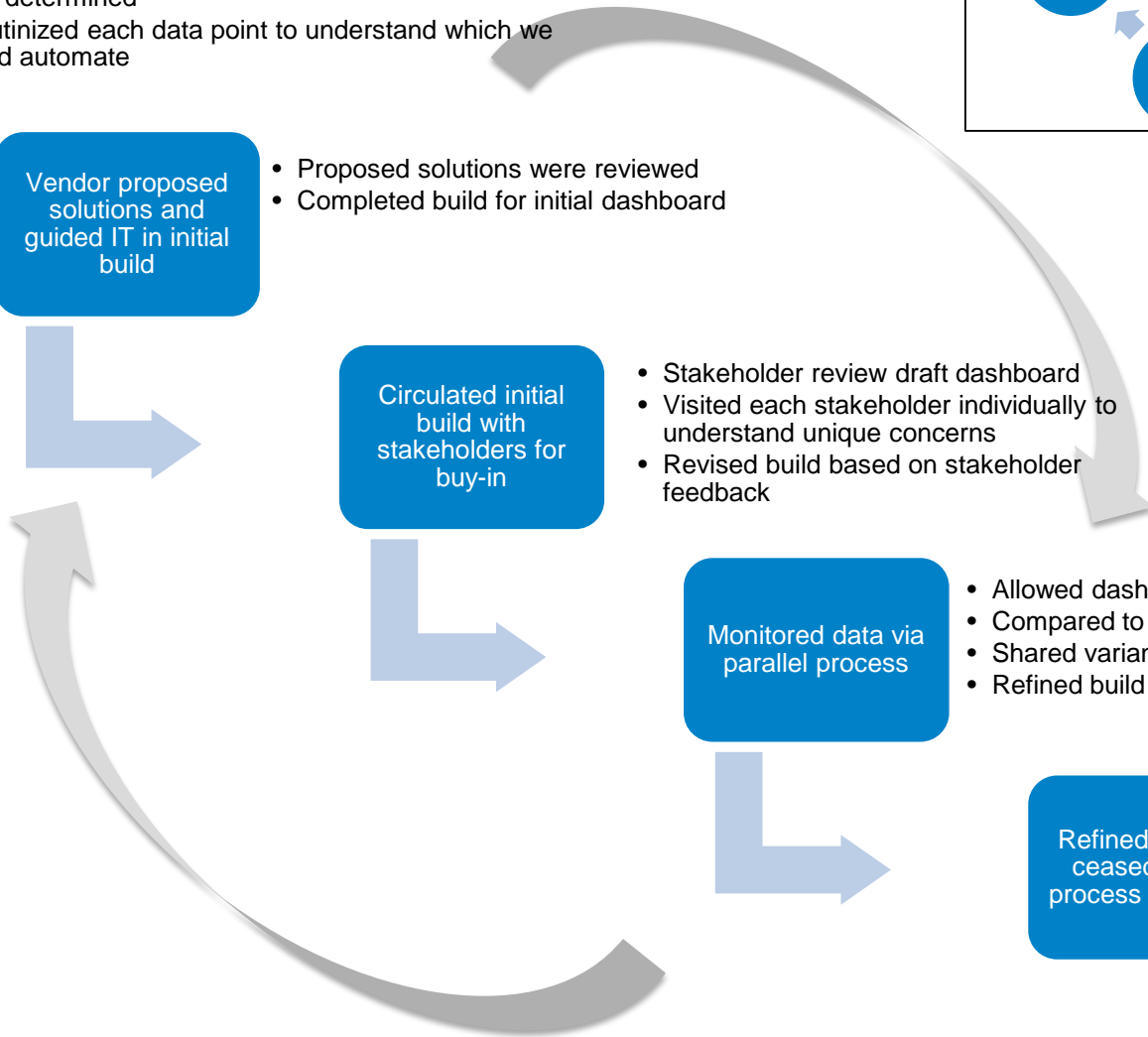


Monitored data via parallel process

- Allowed dashboard to calculate data
- Compared to results of prior process
- Shared variance data with stakeholders
- Refined build based upon feedback



Refined build and ceased parallel process monitoring



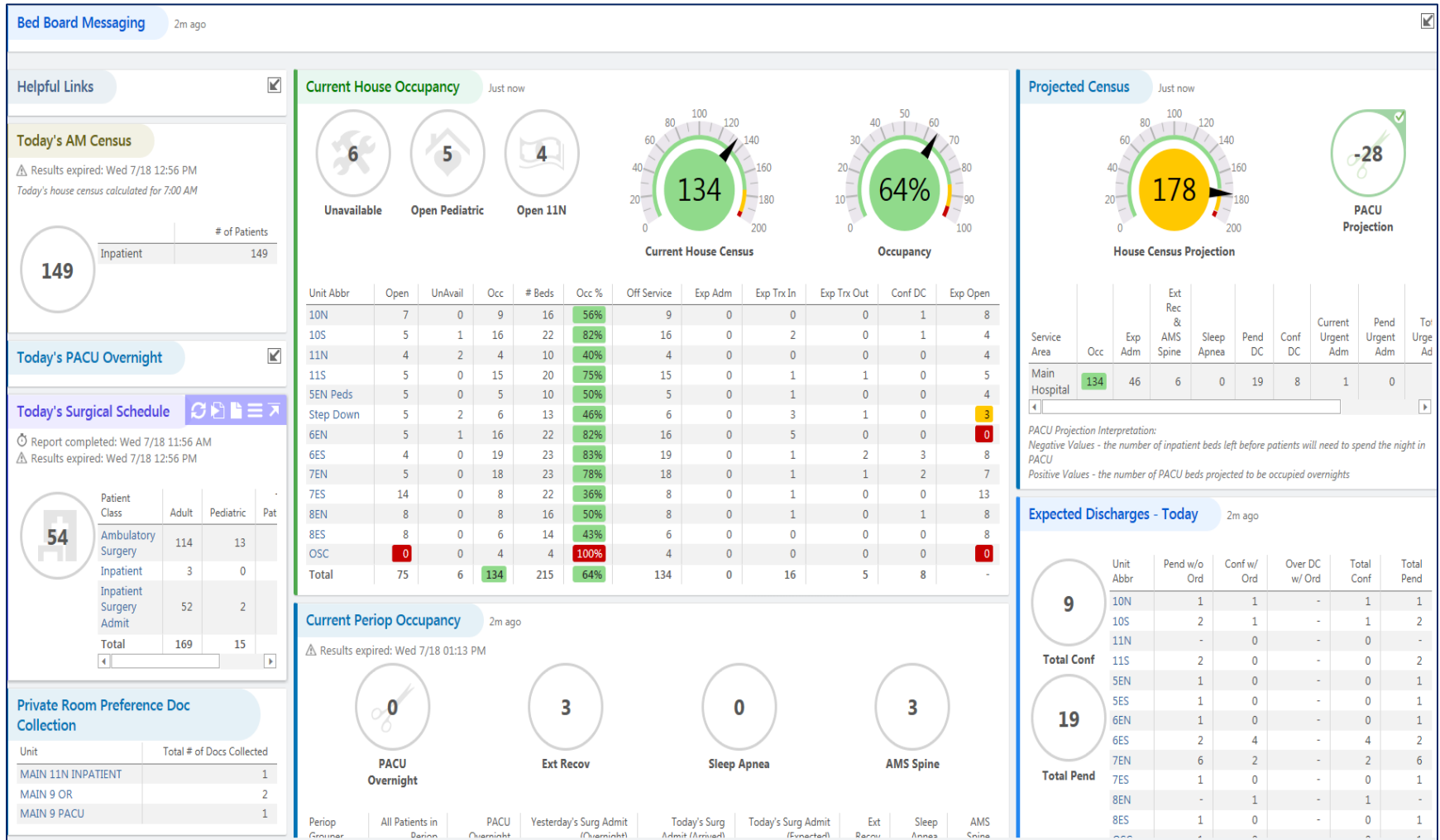
Validation Method

| DATE | | DB Projection | Email Projection | DB Projection | Email Projection | DB Projection | Email Projection | DB Projection | Email Projection | Next Day AM Census | % Variance: (Email Projection to AM Census) | % Variance: (AM Census to DB Projection) |
|--|-------------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|--------------------|---|--|
| August 07 2016 | House Census Projection | | 117 | 99 | 99 | 82 | 84 | 83 | 84 | 87 | 3.4% | 4.8% |
| August 08 2016 | House Census Projection | 136 | 140 | 131 | 135 | 125 | 127 | 122 | 123 | 124 | 0.8% | 1.6% |
| August 09 2016 | House Census Projection | 158 | 166 | 153 | 154 | 143 | 148 | 139 | 146 | 143 | 2.1% | 2.9% |
| August 10 2016 | House Census Projection | 201 | 207 | 200 | 203 | 197 | 201 | 196 | 199 | 197 | 1.0% | 0.5% |
| August 11 2016 | House Census Projection | 226 | 230 | 213 | 219 | 204 | 207 | 204 | 200 | 205 | 2.4% | 0.5% |
| August 12 2016 | House Census Projection | 216 | 222 | 199 | 205 | 190 | 201 | 187 | 196 | 194 | 1.0% | 3.7% |
| August 13 2016 | House Census Projection | 171 | 174 | 163 | 167 | 143 | 145 | 137 | 138 | 142 | 2.8% | 3.6% |
| Weekly Average (8/7-8/13/2016) | | | | | | 1084 | | 1068 | | 1092 | 2.0% | 2.2% |
| August 14 2016 | House Census Projection | 118 | 117 | 101 | 102 | 93 | 95 | 94 | 95 | 96 | 1.0% | 2.1% |
| August 15 2016 | House Census Projection | 140 | 139 | 136 | 133 | 124 | 120 | 122 | 120 | 126 | 4.8% | 3.3% |
| August 16 2016 | House Census Projection | 167 | 173 | 172 | 167 | 163 | 165 | 160 | 165 | 169 | 2.4% | 5.6% |
| August 17 2016 | House Census Projection | 202 | 208 | 191 | 199 | 189 | 194 | 190 | 196 | 190 | 3.2% | 0.0% |
| August 18 2016 | House Census Projection | 207 | 218 | 186 | 198 | 183 | 191 | 185 | 189 | 187 | 1.1% | 1.1% |
| August 19 2016 | House Census Projection | 215 | 221 | 198 | 201 | 188 | 188 | 184 | 185 | 181 | 2.2% | 1.6% |
| August 20 2016 | House Census Projection | 154 | 155 | 143 | 142 | 123 | 123 | 117 | 117 | 120 | 2.5% | 2.6% |
| Weekly Average (8/14-8/20/2016) | | | | | | 1063 | | 1052 | | 1069 | 2.4% | 1.6% |
| August 21 2016 | House Census Projection | 99 | 100 | 93 | 93 | 87 | 87 | 84 | 84 | 86 | 2.3% | 2.4% |
| August 22 2016 | House Census Projection | 131 | 136 | 130 | 136 | 120 | 131 | 120 | 127 | 123 | 3.3% | 2.5% |
| August 23 2016 | House Census Projection | 156 | 158 | 161 | 160 | 156 | 156 | 151 | 154 | 156 | 1.3% | 3.3% |
| August 24 2016 | House Census Projection | 181 | 198 | 181 | 189 | 169 | 175 | 146 | 172 | 171 | 0.6% | 17.1% |
| August 25 2016 | House Census Projection | 191 | 196 | 137 | 180 | 164 | 171 | 143 | 169 | 165 | 2.4% | 15.4% |
| August 26 2016 | House Census Projection | 193 | 198 | 136 | 185 | 171 | 173 | 168 | 173 | 170 | 1.8% | 1.2% |
| August 27 2016 | House Census Projection | 149 | 149 | 136 | 137 | 120 | 121 | 116 | 116 | 118 | 1.7% | 1.7% |
| Weekly Average (8/21-8/27/2016) | | | | | | 987 | | 928 | | 989 | 1.7% | 2.2% |
| August 28 2016 | House Census Projection | 95 | 97 | 82 | 84 | 76 | 77 | 76 | 114 | 81 | 46.7% | 6.6% |
| August 29 2016 | House Census Projection | 118 | 122 | 115 | 114 | 115 | 111 | 112 | 109 | 111 | 1.8% | 0.9% |
| August 30 2016 | House Census Projection | 145 | 153 | 139 | 143 | 138 | 144 | | | 134 | | |
| August 31 2016 | House Census Projection | 173 | 178 | 166 | 172 | 160 | 165 | 166 | 163 | 164 | 0.6% | 1.2% |

Parallel process review

- Daily review of variance
- Investigate with various stakeholders
- Modify variables and monitor outcomes

Technology Leveraged: HSS Capacity Management Dashboard



Projected Census Just now

178

House Census Projection

28

PACU Projection

| Service Area | Occ | Exp Adm | Ext Rec & AMS Spine | Sleep Apnea | Pend DC | Conf DC | Current Urgent Adm | Pend Urgent Adm | Tor Urge Ad |
|---------------|-----|---------|---------------------|-------------|---------|---------|--------------------|-----------------|-------------|
| Main Hospital | 134 | 46 | 6 | 0 | 19 | 8 | 1 | 0 | |

PACU Projection Interpretation:
Negative Values - the number of inpatient beds left before patients will need to spend the night in PACU
Positive Values - the number of PACU beds projected to be occupied overnights

Expected Discharges - Today 2m ago

| Unit Abbr | Pend w/o Ord | Conf w/ Ord | Over DC w/ Ord | Total Conf | Total Pend |
|-------------------|--------------|-------------|----------------|------------|------------|
| 10N | 1 | 1 | - | 1 | 1 |
| 10S | 2 | 1 | - | 1 | 2 |
| 11N | - | 0 | - | 0 | - |
| Total Conf | 2 | 0 | - | 0 | 2 |
| 5EN | 1 | 0 | - | 0 | 1 |
| 5ES | 1 | 0 | - | 0 | 1 |
| 6EN | 1 | 0 | - | 0 | 1 |
| 6ES | 2 | 4 | - | 4 | 2 |
| 7EN | 6 | 2 | - | 2 | 6 |
| 7ES | 1 | 0 | - | 0 | 1 |
| 8EN | - | 1 | - | 1 | - |
| 8ES | 1 | 0 | - | 0 | 1 |
| Total Pend | 9 | 5 | - | 5 | 9 |

Current Period Occupancy 2m ago

⚠ Results expired: Wed 7/18 01:13 PM

0

PACU Overnight

3

Ext Recov

0

Sleep Apnea

3

AMS Spine

| Periop Group | All Patients in Bed | PACU Overnight | Yesterday's Surg Admit (Overnight) | Today's Surg Admit (Arrived) | Today's Surg Admit (Smart) | Ext Pacu | Sleep Apnea | AMS Spine |
|--------------|---------------------|----------------|------------------------------------|------------------------------|----------------------------|----------|-------------|-----------|
| | | | | | | | | |

| Unit Abbr | Open | UnAvail | Occ | # Beds | Occ % | Off Service | Exp Adm | Exp Trx In | Exp Trx Out | Conf DC | Exp Open |
|--------------|-----------|----------|------------|------------|------------|-------------|----------|------------|-------------|----------|----------|
| 10N | 7 | 0 | 9 | 16 | 56% | 9 | 0 | 0 | 0 | 1 | 8 |
| 10S | 5 | 1 | 16 | 22 | 82% | 16 | 0 | 2 | 0 | 1 | 4 |
| 11N | 4 | 2 | 4 | 10 | 40% | 4 | 0 | 0 | 0 | 0 | 4 |
| 11S | 5 | 0 | 15 | 20 | 75% | 15 | 0 | 1 | 1 | 0 | 5 |
| 5EN Peds | 5 | 0 | 5 | 10 | 50% | 5 | 0 | 1 | 0 | 0 | 4 |
| Step Down | 5 | 2 | 6 | 13 | 46% | 6 | 0 | 3 | 1 | 0 | 3 |
| 6EN | 5 | 1 | 16 | 22 | 82% | 16 | 0 | 5 | 0 | 0 | 0 |
| 6ES | 4 | 0 | 19 | 23 | 83% | 19 | 0 | 1 | 2 | 3 | 8 |
| 7EN | 5 | 0 | 18 | 23 | 78% | 18 | 0 | 1 | 1 | 2 | 7 |
| 7ES | 14 | 0 | 8 | 22 | 36% | 8 | 0 | 1 | 0 | 0 | 13 |
| 8EN | 8 | 0 | 8 | 16 | 50% | 8 | 0 | 1 | 0 | 1 | 8 |
| 8ES | 8 | 0 | 6 | 14 | 43% | 6 | 0 | 0 | 0 | 0 | 8 |
| OSC | 0 | 0 | 4 | 4 | 100% | 4 | 0 | 0 | 0 | 0 | 0 |
| Total | 75 | 6 | 134 | 215 | 64% | 134 | 0 | 16 | 5 | 8 | - |

Data Collection

Expected Discharges - Today Just now

| Unit Abbr | Pend w/o Ord | Conf w/ Ord | Over DC w/ Ord | Total Conf | Total Pend |
|--------------|--------------|-------------|----------------|------------|------------|
| 10N | - | 0 | - | 0 | - |
| 10S | 2 | 0 | - | 0 | 2 |
| 11N | - | 0 | - | 0 | - |
| 11S | 1 | 1 | - | 1 | 1 |
| 5EN | 1 | 2 | - | 2 | 1 |
| 5ES | - | 2 | - | 2 | - |
| 6EN | 1 | 2 | - | 2 | 1 |
| 6ES | - | 1 | - | 1 | - |
| 7EN | 1 | 2 | - | 2 | 1 |
| 7ES | 1 | 1 | - | 1 | 1 |
| 8EN | - | 0 | 1 | 1 | - |
| 8ES | - | 0 | - | 0 | - |
| OSC | - | 0 | - | 0 | - |
| Total | 7 | 11 | 1 | 12 | 7 |

12

Total Conf

7

Total Pend

Confirmed Discharges (Total Conf) From Dashboard

| | |
|---------------|----|
| 12:00p | 12 |
| 2:00p | 0 |
| 4:30p | 0 |
| 8:30p | 0 |

Pending Discharges (Total Pend) From Dashboard

| | |
|---------------|---|
| 12:00p | 7 |
| 2:00p | 0 |
| 4:30p | 0 |
| 8:30p | 0 |

Implementation: Staff Training

| Today's AM Census (7:00am) | |
|-------------------------------|-----|
| Total | 195 |

| Today's PACU Overnight (7:00am) | |
|------------------------------------|---|
| Total | 6 |

| Today's Surgical Schedule From Dashboard | |
|---|---|
| 12:00p | 0 |
| 2:00p | 0 |
| 4:30p | 0 |
| 8:30p | 0 |

| Urgent Admits | |
|---------------|---|
| 12:00p | 0 |
| 2:00p | 0 |
| 4:30p | 0 |
| 8:30p | 0 |

| Confirmed Discharges (Total Conf) From Dashboard | |
|--|----|
| 12:00p | 12 |
| 2:00p | 0 |
| 4:30p | 0 |
| 8:30p | 0 |

| | 1st Floor Call the Floor | | 4th Floor Call the Floor | | 9th Floor Call the Floor | |
|--------|-----------------------------|----------------|-----------------------------|----------------|-----------------------------|----------------|
| | AMS Needing Beds | Sleep Apnea | AMS Needing Beds | Sleep Apnea | AMS Needing Beds | Sleep Apnea |
| 12:00p | 0 | 0 | 0 | 0 | 0 | 0 |
| 2:00p | 0 | 0 | 0 | 0 | 0 | 0 |
| 4:30p | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:30p | 0 | 0 | 0 | 0 | 0 | 0 |

| Pending Discharges (Total Pend) From Dashboard | |
|--|---|
| 12:00p | 7 |
| 2:00p | 0 |
| 4:30p | 0 |
| 8:30p | 0 |

| Discharges Already Departed From Dashboard | |
|---|---|
| 12:00p | 0 |
| 2:00p | 0 |
| 4:30p | 0 |
| 8:30p | 0 |

| | 12:15PM | 2:30 PM | 5:00 PM | 9:00 PM |
|-----------------------------------|---------|---------|---------|---------|
| Today's AM Census | 201 | 201 | 201 | 201 |
| Scheduled Admits: | 0 | 0 | 0 | 0 |
| Emergency IP Admits: | 0 | 0 | 0 | 0 |
| AMS Needed Beds | 0 | 0 | 0 | 0 |
| Sleep Apnea: | 0 | 0 | 0 | 0 |
| Expected Census W/O D/C's (EC) | 201 | 201 | 201 | 201 |
| Active Bed Count (BC): 215 | 142 | 215 | 215 | 215 |
| EC-BC | 59 | 0 | 0 | 0 |
| Confirmed Discharges: | 12 | 0 | 0 | 0 |
| PACU Projection | 47 | FALSE | FALSE | FALSE |
| House Census Projection | 189 | 215 | 215 | 215 |
| Pending Discharges | 7 | 0 | 0 | 0 |
| Discharges Already Departed | 0 | 0 | 0 | 0 |
| Notes: | 12:30PM | 2:30 PM | 5:00 PM | 9:00 PM |
| Blocked for Clinical Reason | 73 | | | |
| Peds Unused | 0 | | | |
| 11 N Unrequested | 0 | | | |
| Closed for Maintenance | 0 | | | |
| Closed for Special Use | 0 | | | |
| Total Unavailable Beds | 73 | 0 | 0 | 0 |

Staff Instructions

Enter data from the ADT Capacity Management Dashboard into the orange portions of the excel template above



Value Derived

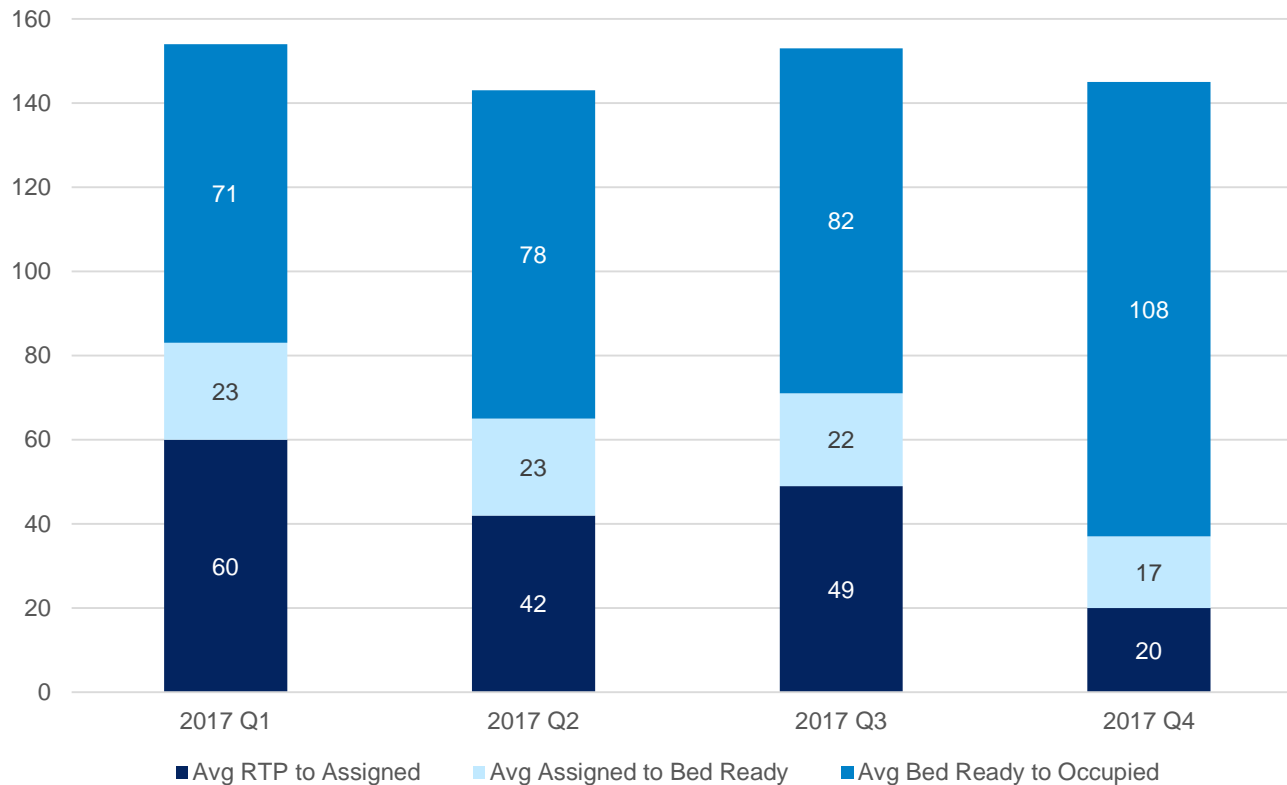
- Improvements resulted in increased flexibility of PAS staff
- Increased capacity allowed PAS leadership to establish a 3rd shift without adding FTEs

| | 2016 | 2018 |
|--|---------------|-----------|
| People Trained | 5 | 19 |
| Work Effort/Census Notification | 45 min - 1 hr | 4-5 min |

- 96% Reduction in OR cases put on hold due to PACU bed shortages (2015 vs 2018)
 - Decreased overtime hours associated with OR holds
 - Increased OR utilization

Outcomes

Bed Assignment & PACU Turnover (Calculated in Minutes)



Patient placement is dependent on inpatient capacity

Part II: Clinical Pathway Management to Improve Capacity and Optimize Patient Care

The logo for HSS (Hospital for Special Surgery) is a blue square with the letters "HSS" in white, bold, sans-serif font. It is positioned in the bottom left corner of the slide, partially overlapping a decorative grid of light blue squares.

HSS

David Rebhan

Director, Operational Excellence

At HSS, Clinical Pathways Are Procedure Specific Post Op Order Sets That Coordinate And Standardize Care

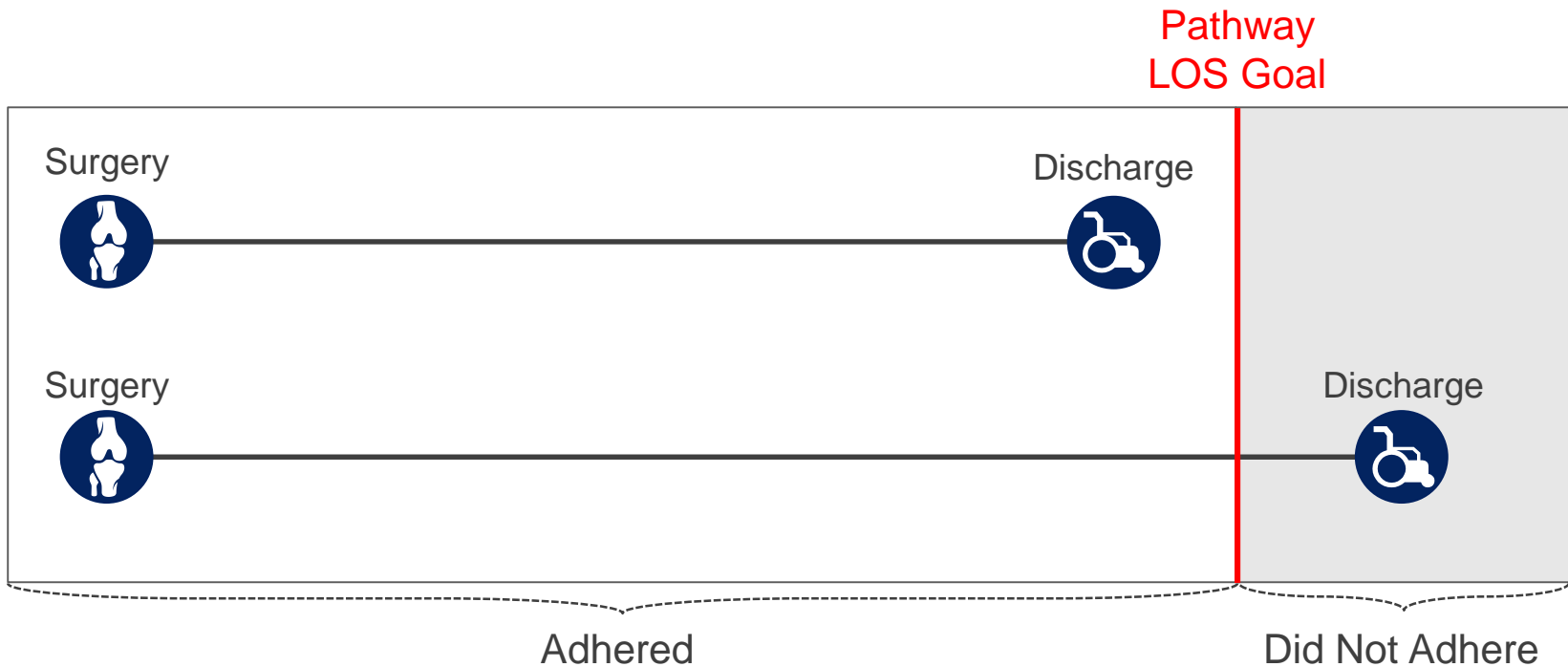
- Pathways Overview
 - Time based goals/milestones for interdisciplinary care of a defined patient group
 - Procedures: Primary Hip, Primary Knee, etc.
 - Disease states: Diabetes, Kidney, CVD, etc.
 - Created to reduce variation in care and increase value for similar patient groups
- Pathways at HSS
 - EMR order-sets: post-op through discharge
 - Documented by clinical teams and reviewed in rounds
 - Inpatient pathways cover more than 80% of HSS inpatients
 - Several ambulatory pathways recently developed

The screenshot displays the 'Pathway Review' interface for 'HSS TOTAL KNEE REPLACEMENT'. At the top, there are navigation tabs: 'Manage Pathways', 'Document Outcomes', 'Care Plan', 'Mark as Reviewed', 'Complete Pathway', and 'Discontinue Pathway'. Below this, a timeline shows the patient's status: 'Post op through 24 hours' (Current, Today at 0841, 1 Day), '24 to 48 hours' (Future, ~Tomorrow at 0841, 1 Day), and '48-72 Hours' (Future, ~08/13/14 0841, 2 Days). The interface is grouped by 'Order/Documentation Type' and 'Pathway View'. The main content is organized into sections: 'Monitoring' (Vital Signs, Neurovascular checks, Intake and Output totals), 'Pain Management' (Inpatient consult - Chronic Pain Service), 'Medications' (Acetaminophen), 'Nutrition' (Clear Liquids), and 'Treatment Plan' (Post-Op Treatment Plan, Physical Therapy, Therapeutic exercises).

Pathway performance is measured as “Pathway LOS Adherence”

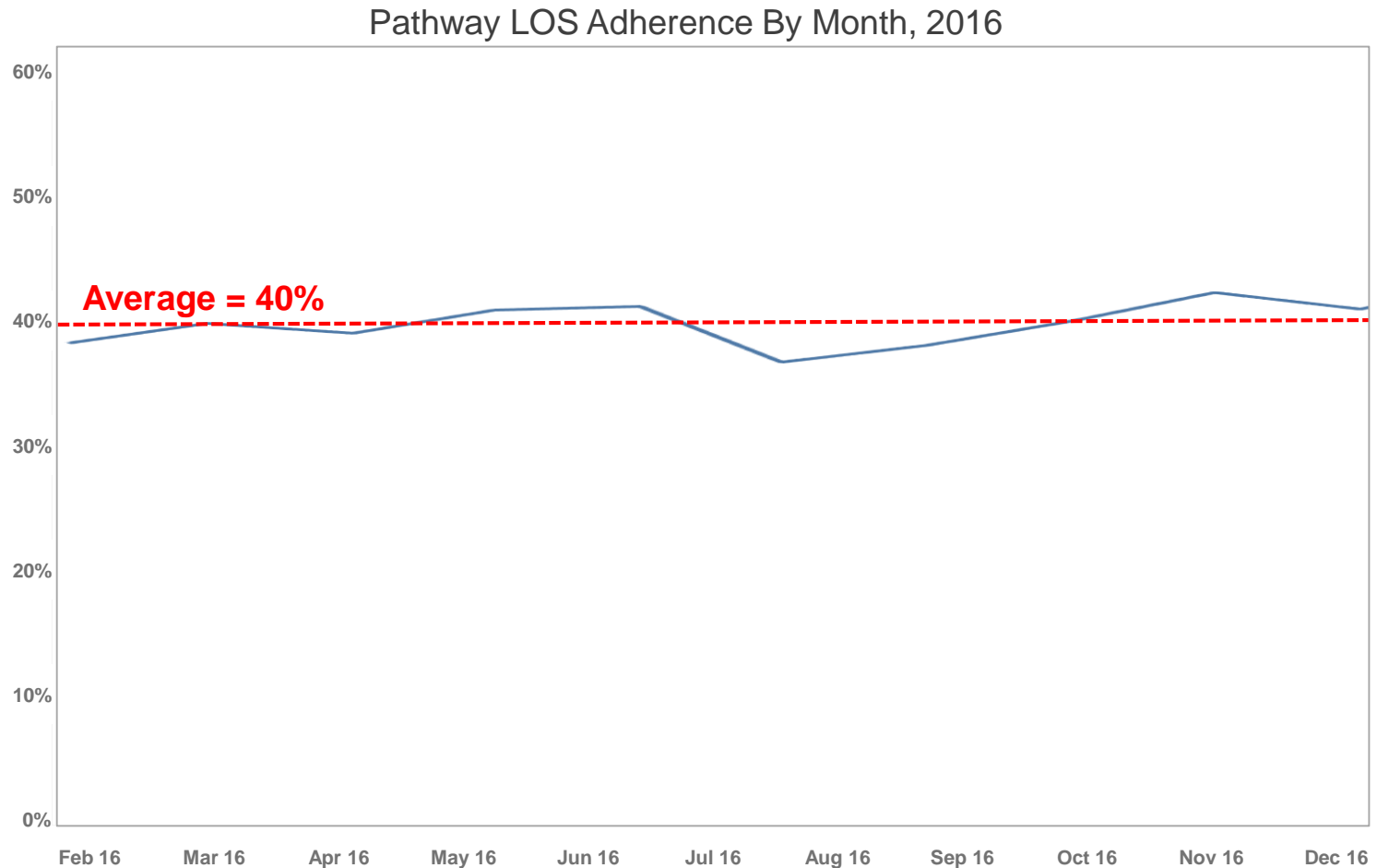


Pathway LOS Adherence Is When A Patient Discharges By Their Pathway Length Of Stay Goal



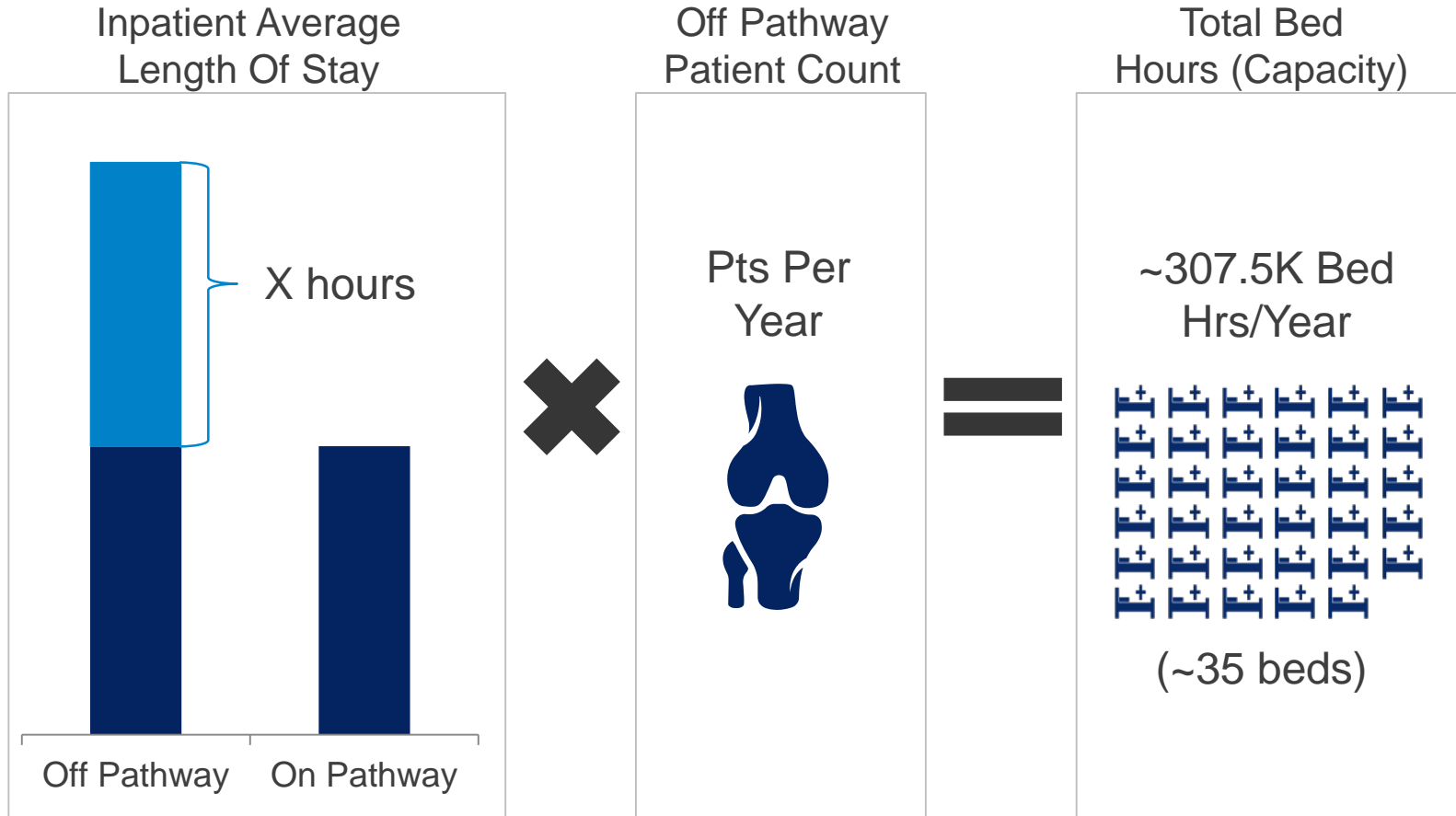
At HSS, there is no margin of error in LOS Adherence

In 2016, Overall Pathway LOS Adherence Stabilized At ~40%



For every 10 patients, 4 adhered to their pathway

If All HSS Patients Adhered To Pathways, HSS Would Gain More Than 300K Bed Hours Per Year



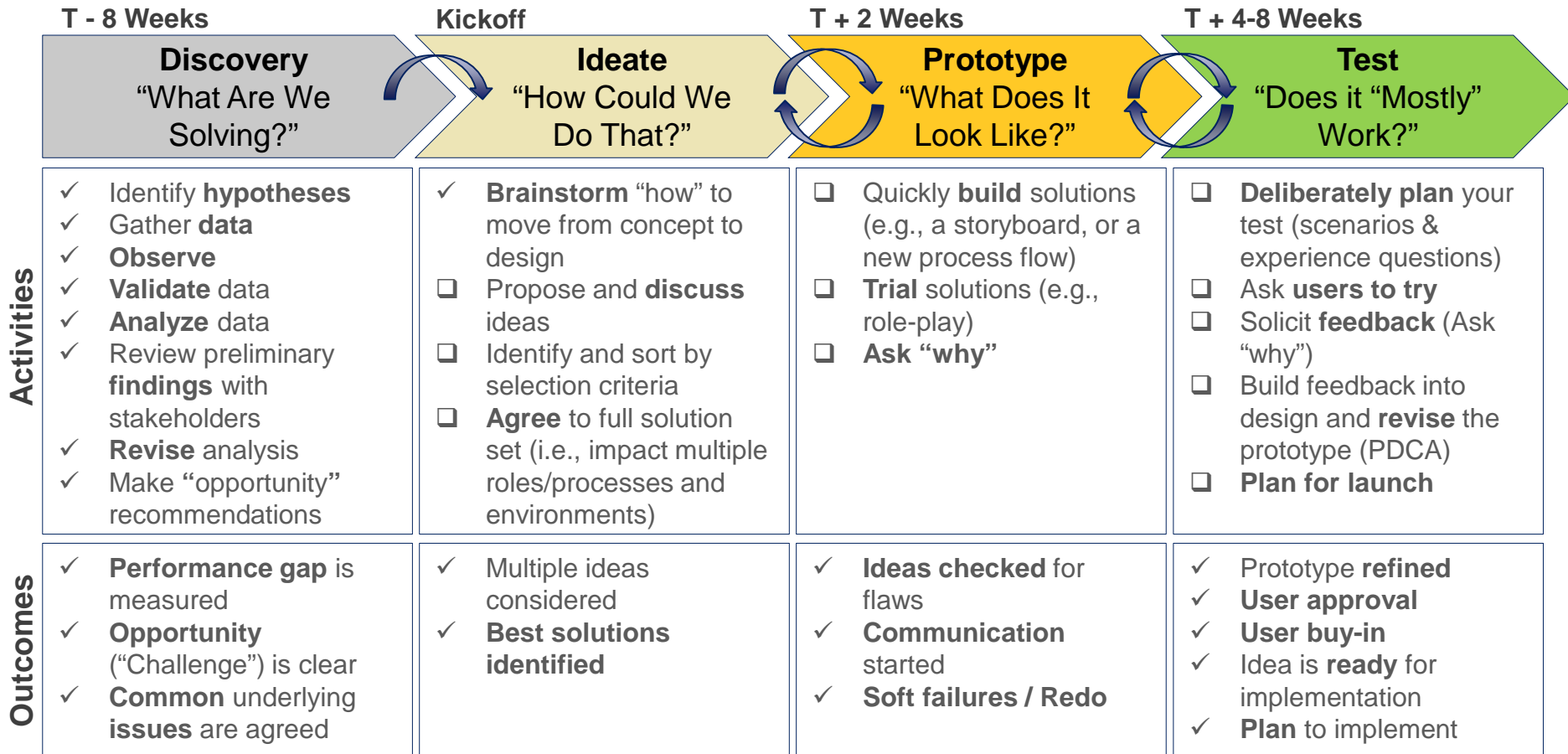
Addressing root causes of “off pathway” pts. will improve resource use



To Improve Pathway Adherence, An Interdisciplinary Project Team Was Chartered

| | | | | |
|--|---|---|--|--|
| Problem Statement | HSS patients are not always discharged within expected length of stay as determined by clinical pathways | | | |
| Scope/Activities & Deliverables | <input type="checkbox"/> Develop/refine reporting and measurement <input type="checkbox"/> Determine top 5 contributors to adherence and isolate clinical vs. non clinical (operational) causes <input type="checkbox"/> Recommend new pathways for development and pathways changes to achieve better adherence (e.g., LOS Targets) <input type="checkbox"/> Establish action plans and implement operational changes (e.g., "Pathway Clock" workflow design) | | | |
| Metrics | # | Description | Baseline | Target |
| | 1 | ALOS | | |
| | 2 | Pathway Adherence | 40% | |
| | 3 | Pathways Discharge Delay (Avg) | | |
| | 4 | ID Top 5 Causes Of Noncompliance | | |
| Benefits | 1. Proactive management of patient care 2. Clinically appropriate length of stay 3. Decreased costs for HSS and patient-family | | 3. Staff satisfaction with plan of care documentation 4. Patient satisfaction and quality of care | |
| Team Members | Leadership | Team | | Ad Hoc |
| | <ul style="list-style-type: none"> • Sponsor(s) • Ops. Owner(s) • Op. Ex. | <ul style="list-style-type: none"> • Case Management • Nursing • Nutrition • Physician Assistant • Physician • Pharmacy • Physical Therapy • Information Technology • Value Management | | <ul style="list-style-type: none"> • Informatics: • PCD: • Physician: |

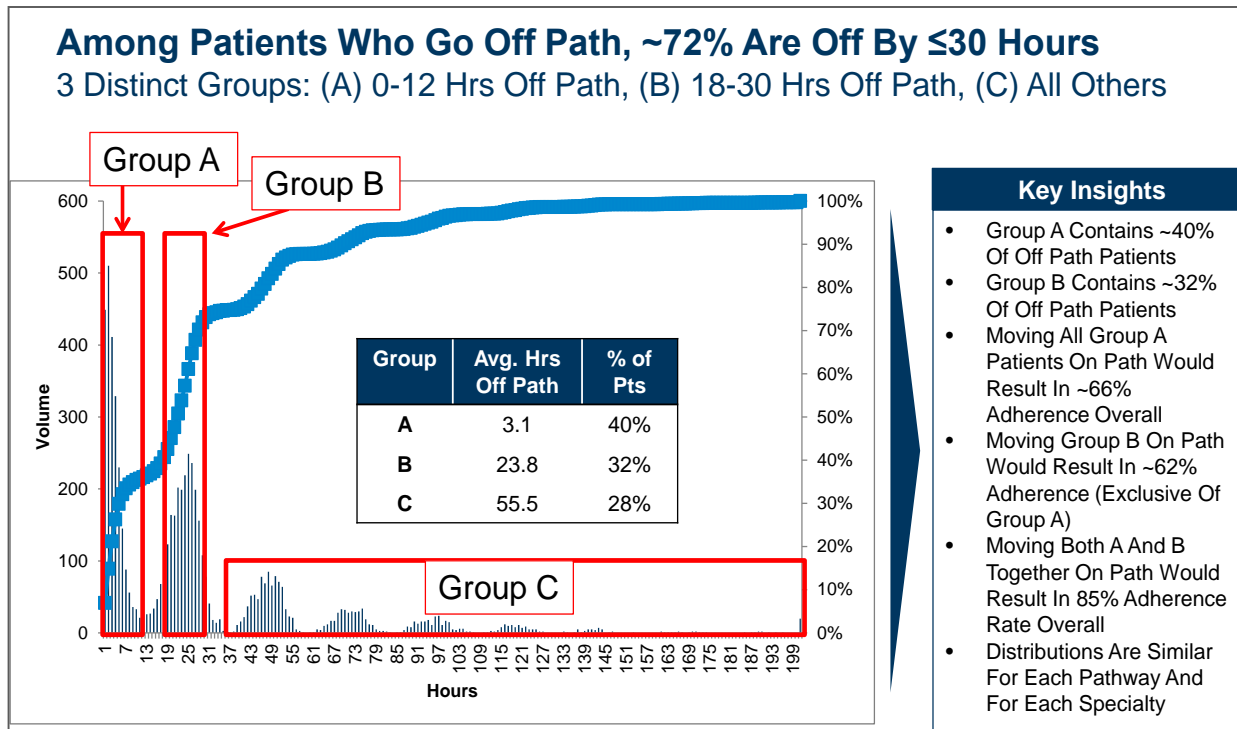
The Project Team Followed A Design Thinking Approach



In this approach, the discovery phase starts with data analysis



The Team's Review Of Data Identified Distinct Groups Of Patients That Do Not Adhere To Pathways



Key Insights

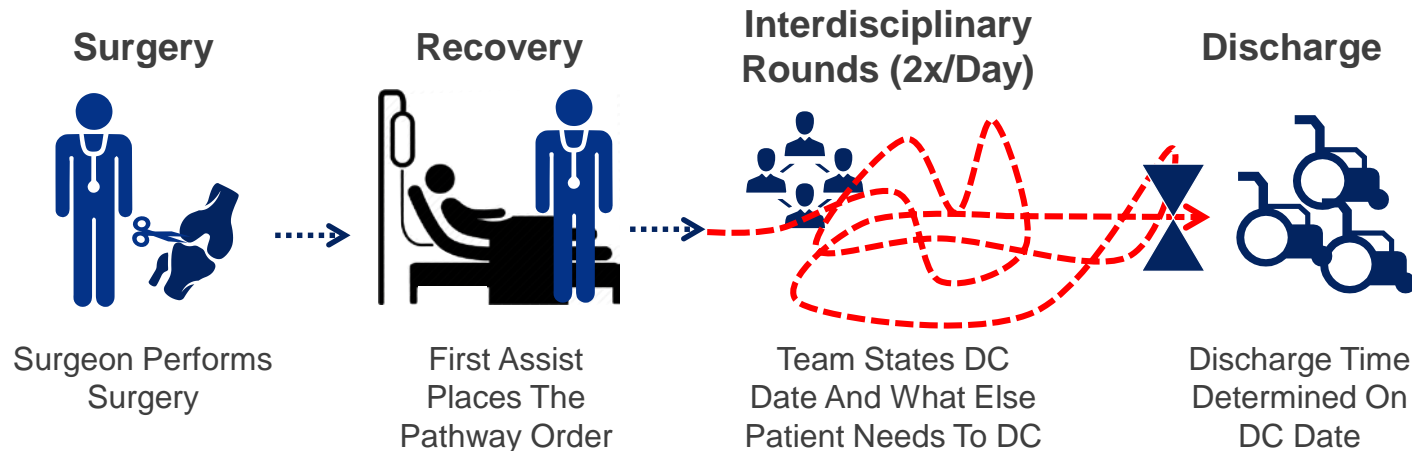
- Group A Contains ~40% Of Off Path Patients
- Group B Contains ~32% Of Off Path Patients
- Moving All Group A Patients On Path Would Result In ~66% Adherence Overall
- Moving Group B On Path Would Result In ~62% Adherence (Exclusive Of Group A)
- Moving Both A And B Together On Path Would Result In 85% Adherence Rate Overall
- Distributions Are Similar For Each Pathway And For Each Specialty

Key Insights

- **Group A:** Patients Exit OR Earlier Than On Path Patients
- **Group B:** Patients Are Moderately Complex
- **Group C:** Patients Are Significantly More Complex
- Same pattern exists across all pathways

The hour of surgery and complexity are primary drivers of adherence

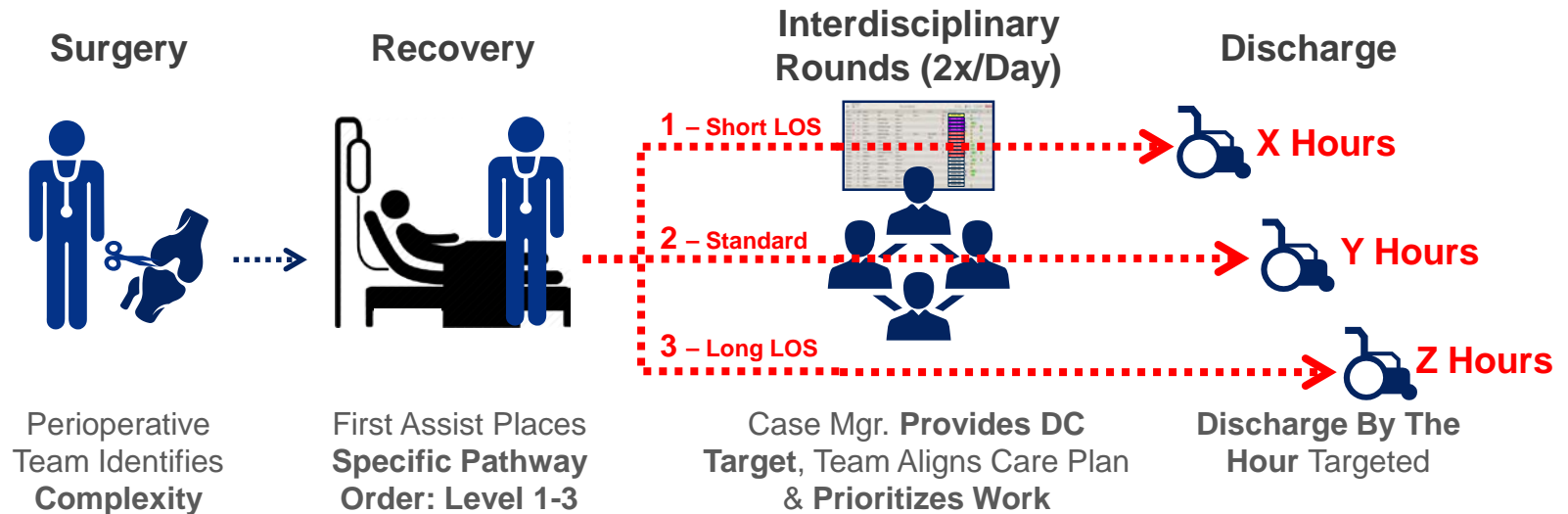
Despite Patient Types, One Procedure Specific Pathway Was Available For Patients, Leading To Bottlenecks At Discharge



| Key Problems | Significance |
|----------------------------------|--|
| Pathways “one size fits all” | <ul style="list-style-type: none"> Few patients discharge on pathway - progress appeared random Priority patients could not be easily identified in work queues (e.g., by medical complexity, discharge targets) |
| DC Date/time targets unspecified | <ul style="list-style-type: none"> Discharge times determined on day of discharge Tasks to prepare for discharge could not be prioritized/coordinated Discharge bottlenecks and patient, family, and staff complaints |

Pathways were not built for patient differences and were unreliable frameworks for planning/execution

Today, Pathways Have Multiple Levels And Discharges Are Scheduled, Allowing Teams To Prioritize And Cascade Work



Key Insights

- Expected DC time driven by pathway order (placed by first assist)
- Pathway LOS is “individualized” for patient needs (low to high complexity)
- Teams queue & organize workflows by the exp. Discharge time
- Patients/families prepared for discharge, allowing them to meet/beat goal

A shared, realistic LOS target provides the foundation for coordination & more effective care delivery

Several EMR Changes Were Required To Operationalize The New Process, Starting With The Pre-Op Clearance Note

1 Pre Op Clearance Note

The screenshot shows a 'Notes' window in an EMR system. The 'My Note' section is active, with a 'Physical Exam' tab selected. The note content includes:

- STOPBang score is (#22919)
- IPSS score= {0-35:19561}
- Comment: ***
- Physical Exam
- LABs: No results found for any previous visit.
- EKG: No results found for this or any previous visit.
- CXR: No results found for this or any previous visit.
- OUTSIDE STUDIES: ***
- All data listed above has been reviewed.
- Overall Assessment: The patient is a 39 y.o. year old male with past medical history of *** presenting for preoperative
- Cardiovascular Assessment: ***
- Perioperative Recommendations: ***
- Recommended Pathway Level: HSS AMB PATHWAY MEDICAL NOTE:26873
- Day of Surgery/Postoperative Recommendations:
 - VTE prophylaxis
 - Medications to take on the morning of surgery: ***

A small table is visible at the bottom right of the note:

| |
|-----|
| 1 |
| 2 |
| 3 |
| N/A |

2 Pathway Order Selection

The screenshot shows the 'Order and Order Set Search' interface. The search term 'unilateral tkr' is entered. The results table is as follows:

| Name | User Version Name | Type |
|---------------------------------------|-------------------|---------|
| Arthroplasty Unilateral TKR - Level 1 | | Pathway |
| Arthroplasty Unilateral TKR - Level 2 | | Pathway |
| Arthroplasty Unilateral TKR - Level 3 | | Pathway |

3 Expected Discharge Date/Time

The screenshot shows the 'Expected Discharge - Expected Discharge Plan' screen. The 'Expected Discharge Date' is set to 6/27/17 and the 'Expected Discharge Time' is set to 0900. The 'Expected discharge changed due to' section includes the following options:

- Medically not clear
- Surgically not clear
- PT not clear
- DC Plan not confirmed
- Other, specify

Key Insights

1. Pre-op the internist documents a pathway level suggestion
2. Post op, the first assist places a final pathway order
3. Once inpatient, the case manager reviews and documents an expected discharge date/time

Additional Changes Included Visualizing The Discharge Goal To Align Interdisciplinary Work And Patient Expectations

1 Electronic White Board

| Bed | Incoming T... | Patient | Patient Name | Service | MD | RN/PCA # | Sa. | Exp. Disch. Du/Time |
|--------------|----------------|------------|--------------|--------------------|-------------------|----------|-----|---------------------|
| 1011-1 | | Jmcd, T | Jmcd, T | Medicine | Physical Thera... | | | 06/11/2017, 18:00 |
| 1016-1 | | Zztest, G | Zztest, G | Neurology | Reichler, B | | | 06/13/2017, 22:00 |
| 1015-1 | | Adt, K | Adt, K | Hand | Wolfe, S | | | 06/13/2017, 22:00 |
| 1021-1 (H... | Ready (Hold... | Beaker, A | Beaker, A | Hip & Knee One | Orthopedics, P | | | 06/14/2017, 18:00 |
| 1014-1 (M... | Ready (Hold... | Test, D | Test, D | Surgical Arthri... | Mayman, D | | | 06/23/2017, 18:00 |
| 1019-1 | | Clindoc, J | Clindoc, J | Sports Medicine... | Diney, D | | | 06/24/2017, 14:00 |

3 TV Display

HOSPITAL FOR SPECIAL SURGERY

Wed. Sep 27, 2017 - 1:15PM
Your Extension: 1206
Your Room #: **PRAI-PROCENTRIC-01**
Your Expected Discharge Date/Time: **September-29-2017 03:33 PM**

- 1 TV and Entertainment
- 2 Patient Education
- 3 Rehabilitation
- 4 My Care
- 5 My Room
- 6 Patient Experience

2 IPOC Panel

| Surgical Procedure | | | |
|--|-----------|--------------|------------------|
| Figgie, Mark P, MD | | | |
| Procedure | Location | Surgery Date | Post op # Days |
| Procedure(s) (LRB): ARTHROSCOPY ANKLE (Left) ARTHROSCOPY HIP (Left) ARTHROSCOPY ELBOW | OR MAIN03 | 10/21/2016 | 245 Days Post-Op |

| Discharge Planning | |
|--------------------|-------------------|
| Flownet Row | Most Recent Value |
| Discharge Plan | Homecare |
| Home Care Services | RN |

| Expected Discharge Date and Time | | |
|----------------------------------|-------------------------|----------------|
| Expected Discharge Date | Expected Discharge Time | Verified |
| Jun 27, 2017 | 6:00 PM | Curran, Noreen |

Key Insights

1. Patient lists with date/time of discharge for staff and patients
2. IPOC panel with expected discharge and pathway details support interdisciplinary rounds
3. In-room TV display of scheduled discharges

In Addition, An Interdisciplinary Rounds Standard Was Created To Help Coordinate Care Along Pathways

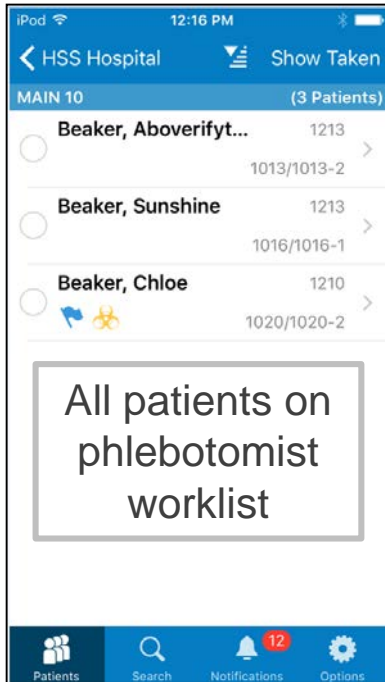
HSS Rounding Standard

| | Question | Responsible | Words That Work |
|---------------------|--|-----------------------------|---|
| I dentify | Who is the patient? Why are they here? | RN | "10-01, Mrs. Jones, patient of Dr. Haas, left knee. Post-op day 1 and wants to leave tomorrow." |
| D isposition | What is the disposition and expected DC date/time? | Case Mgr. | "The preop note says she is going home. Currently expected to go home with services on Friday at 10 am." |
| O bstacles | Are they progressing toward their disposition? | RN PT PT | "... is healing nicely." ... ed 50x2 and is ..." |
| | What are the remaining barriers? | RD Pharm.D. Case Mgr. | "... her diet can be advanced to regular." Case Mgr: "Home care is arranged." |
| C hange | Is it possible to discharge the patient earlier/later? | PCD | "She's doing well. Is there an opportunity to move her to an earlier discharge? What's the best disposition we could achieve?" |
| | Should the disposition be changed? IF BARRIERS: What can we do to remove the issue or improve the disposition? Who is going to take action? | PCD | "What needs to be done to get the patient back on pathway? Do you need help?" OR "[PT], will you assign them a morning mobility session?" |
| S hare | IF DC Plan or Disposition Changes: Who will tell the patient? | PCD | "Since this is a big change to their plan and they are medically ready, can [PA/MD/RN] please make sure that Mrs. Jones' & her family are aware?" |

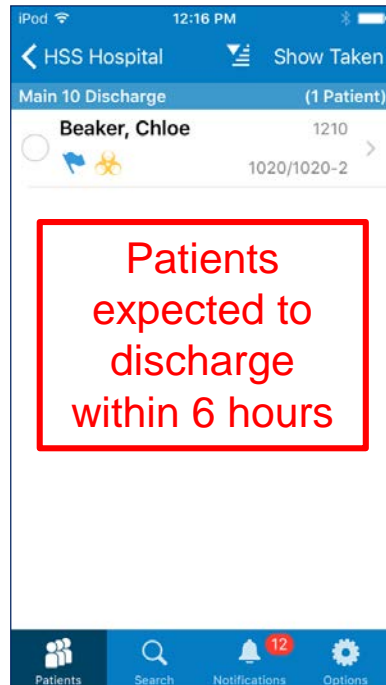
All rounds include a specific focus on patient's discharge goal

Phlebotomy Workflows Were Also Aligned To Pathways Through An Updated Worklist

Previous Worklist



Updated Worklist



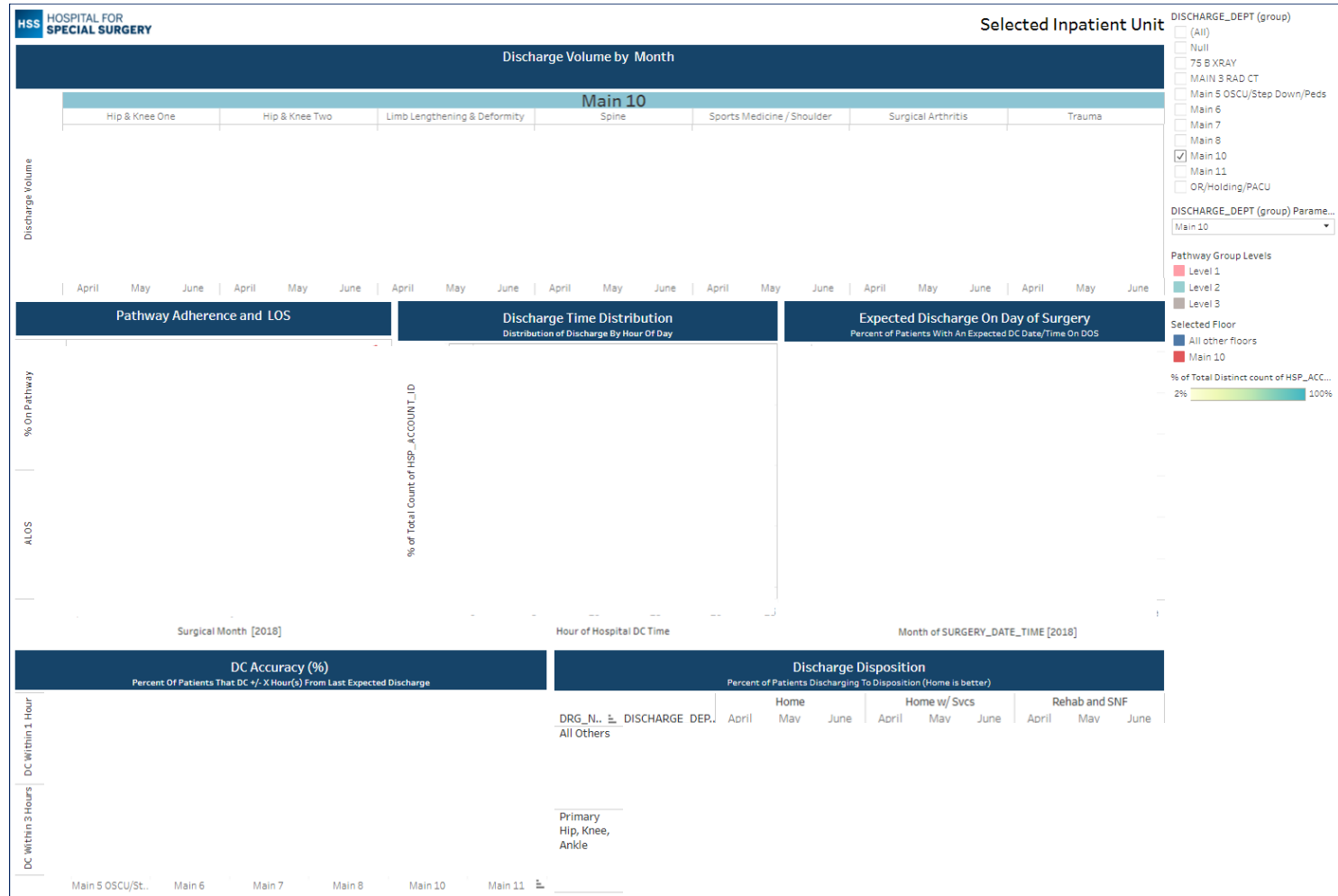
Workflow Changes

- Phlebotomists draw labs in order of the expected discharge
- Work queues now display patients in order of expected discharge
- Display shows patients with expected discharge within next 6 hours

Impact

- Small batches improve lab turnaround times
- Ensures test results are available by start of rounds
- Improves decision making and likelihood of meeting discharge time

A Performance Dashboard Now Provides Daily Feedback To Each Interdisciplinary Team



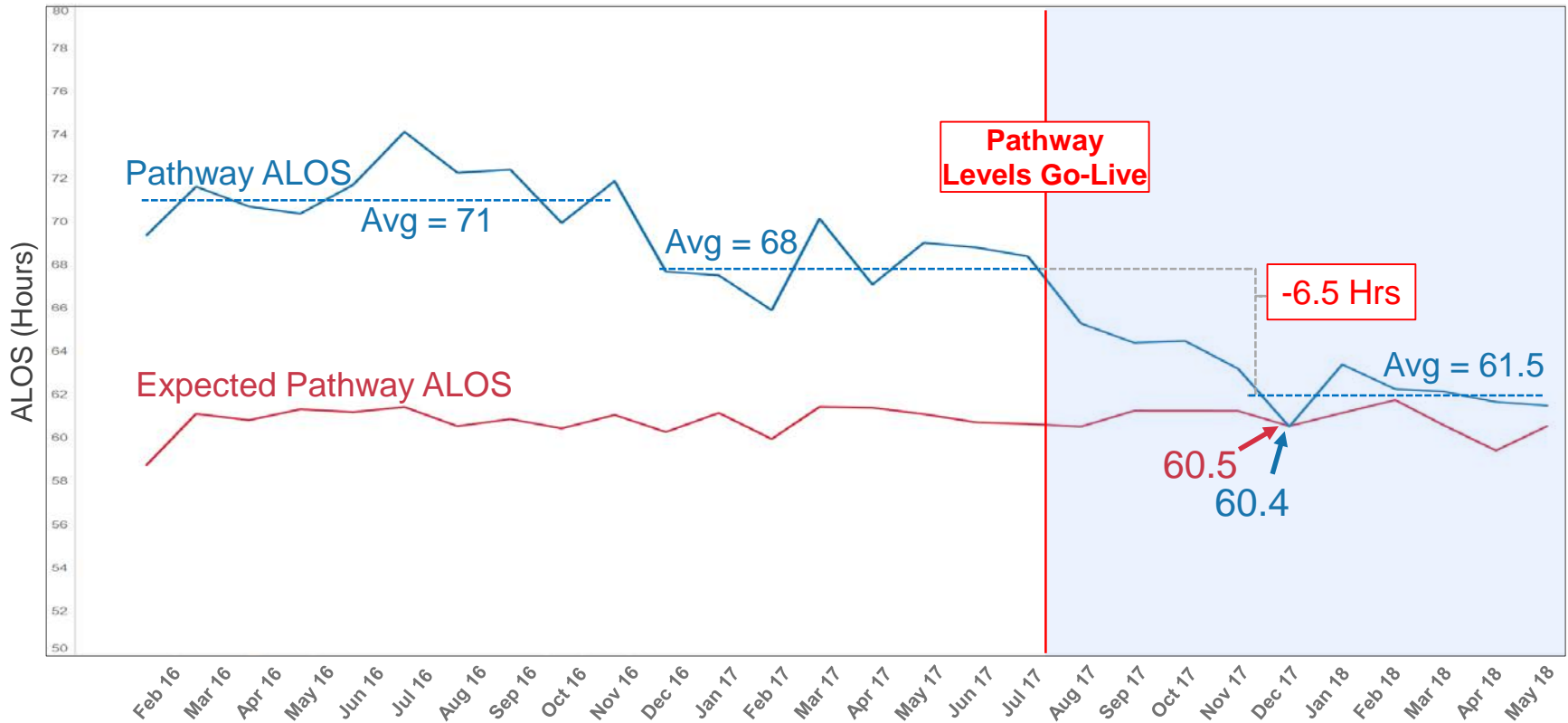
Results



HSS

Since Go-Live, Pathway ALOS Has Declined By 6.5% And Is Now Nearly Equal To The Expected LOS

Pathway ALOS By Month, 2016 – 2018 YTD^{1, 2, 3}

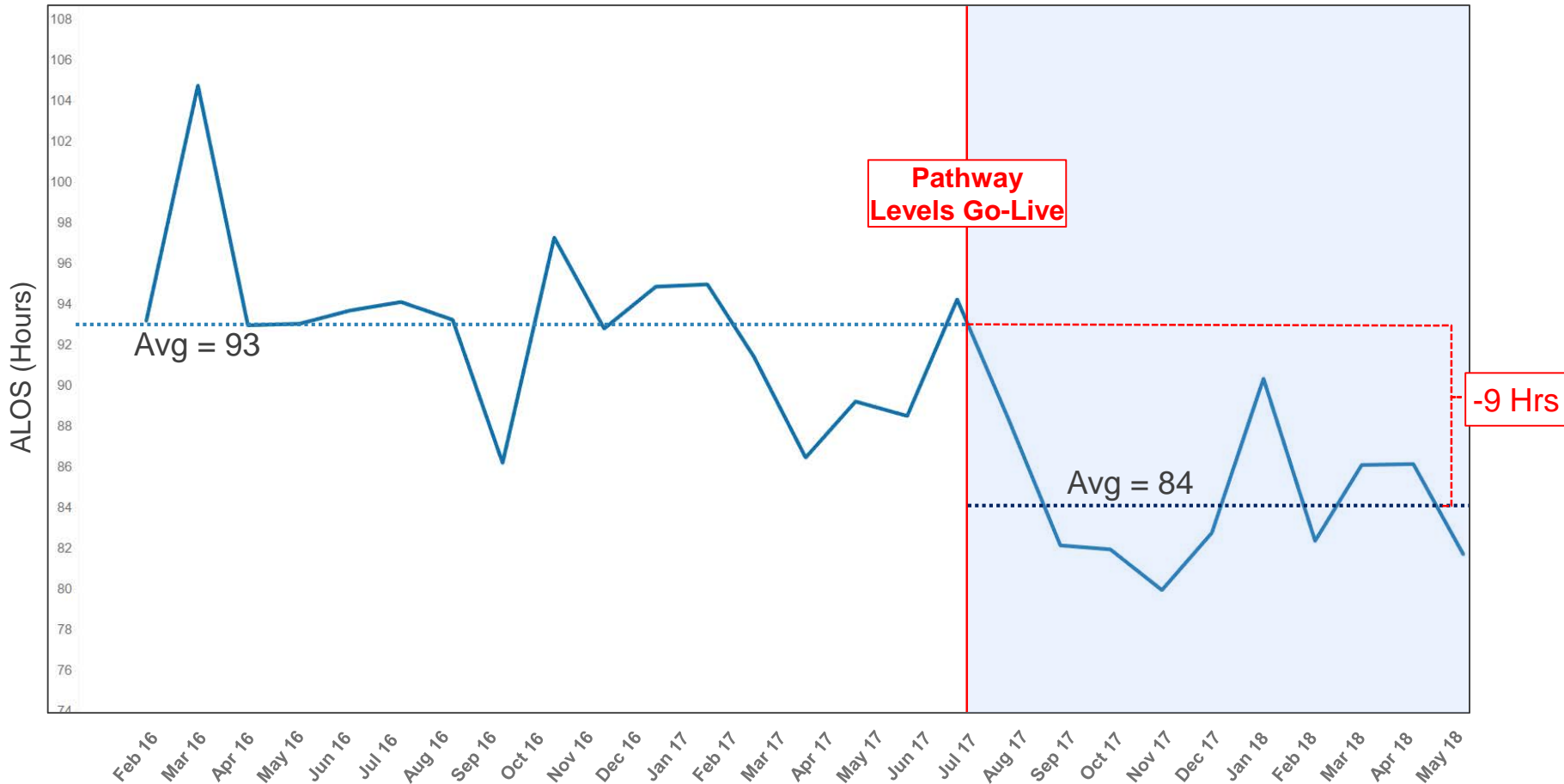


Delivering the expected ALOS allows for better planning



The ALOS For Complex Pathway Patients Decreased ~9 Hrs

Complex Patient ALOS By Month, 2016 – 2018 YTD^{1, 2}



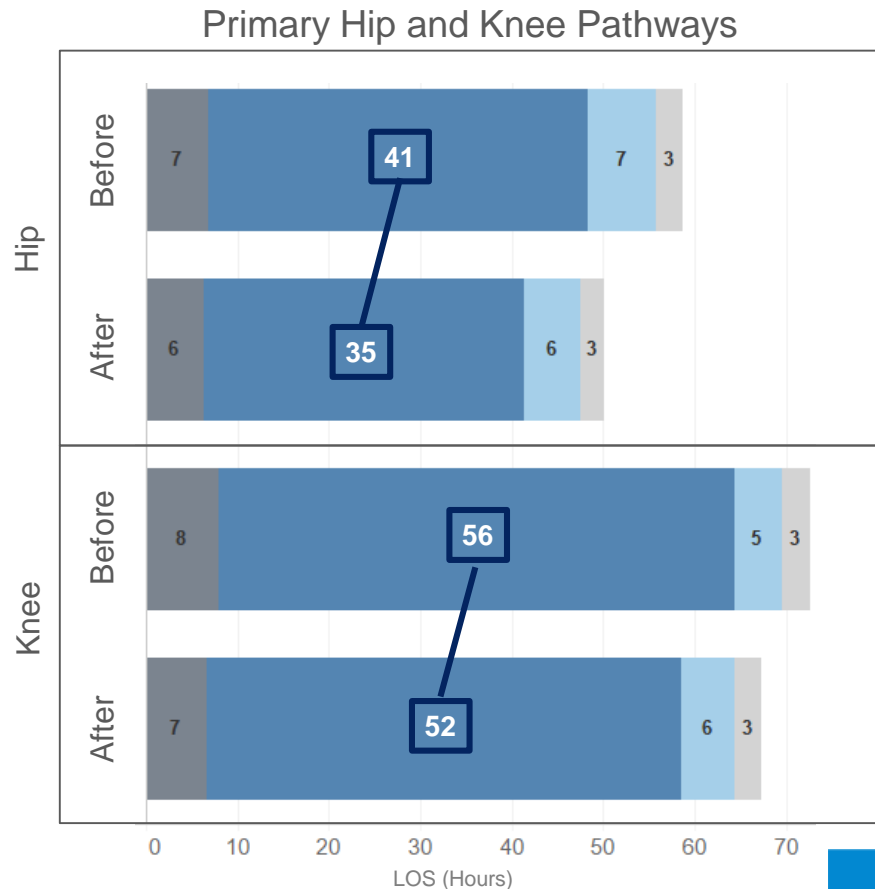
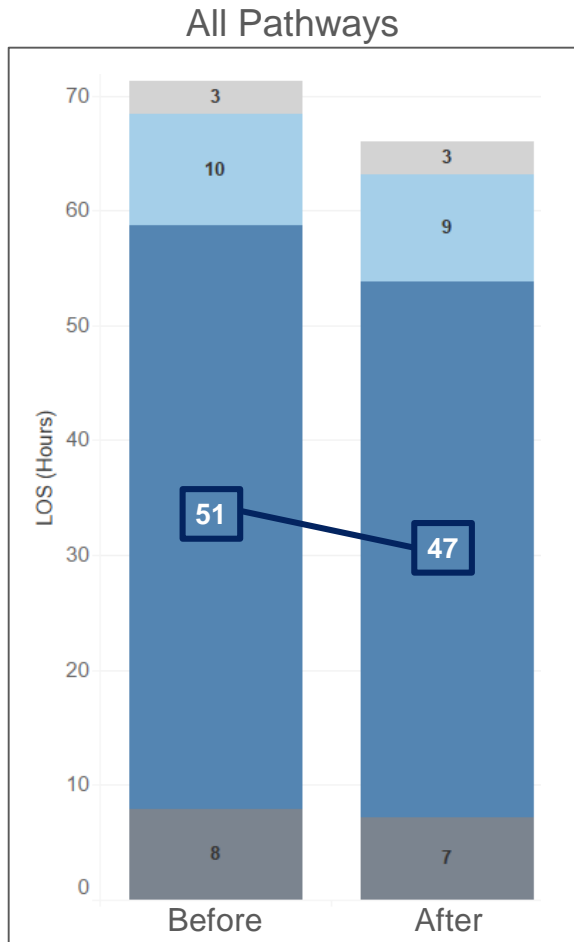
Gaps in care are closing and coordination of care is better, even for most complex of patients



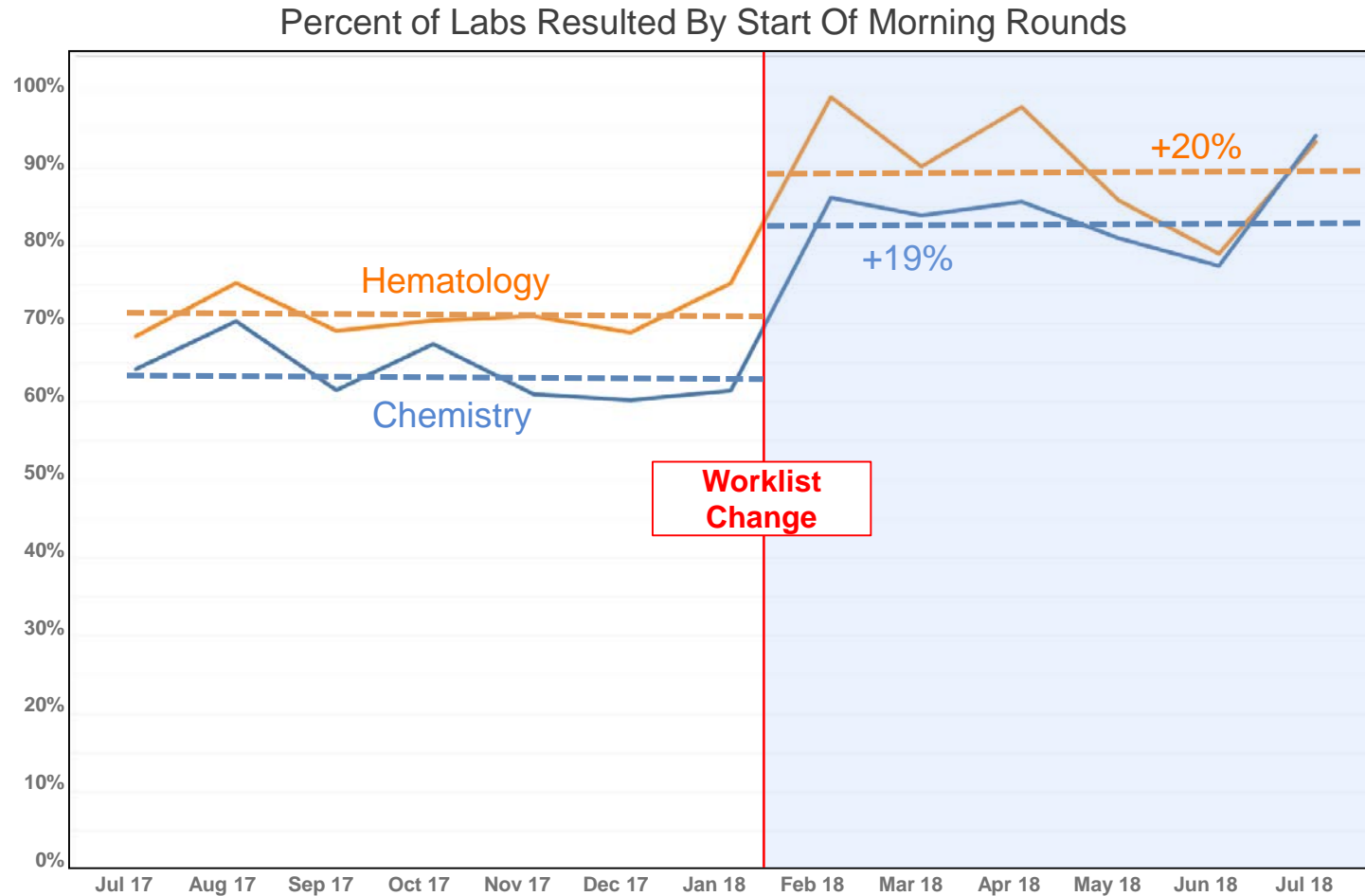
Most Of The ALOS Change Occurred Within The IP to Clear Rehab Phase

ALOS By Phase of Encounter Before & After Pathway LOS Adherence Project

PACU
 IP to Clear
 Clear to DC Order
 Discharge



Aligning Phlebotomy To The Expected Discharge Date/Time Increased The Rate Of Labs Resulted By Rounds

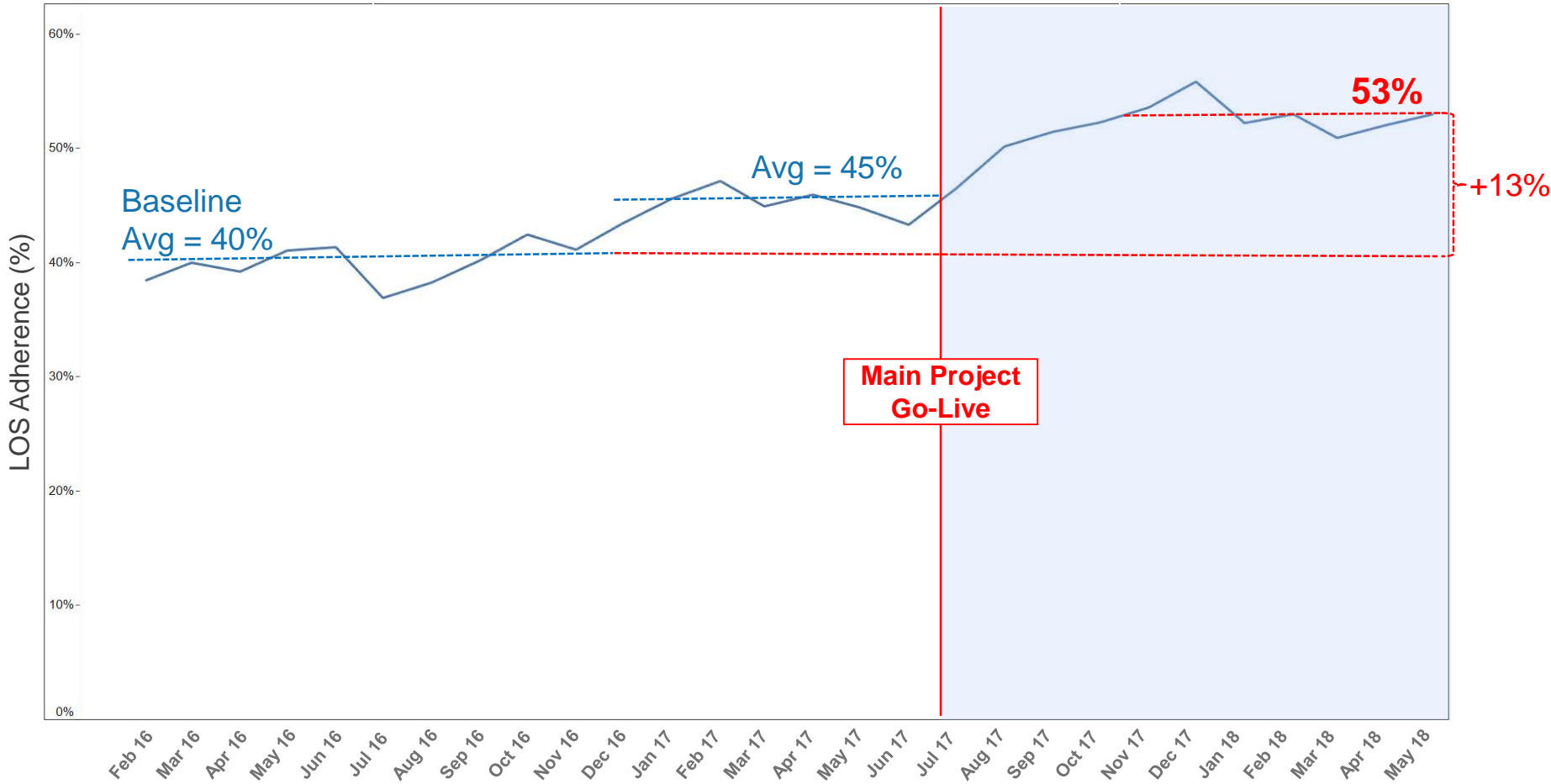


Timely labs allow clinical teams to make decisions regarding discharge and keep patients on pathway



Overall Pathway LOS Adherence Increased By 13%

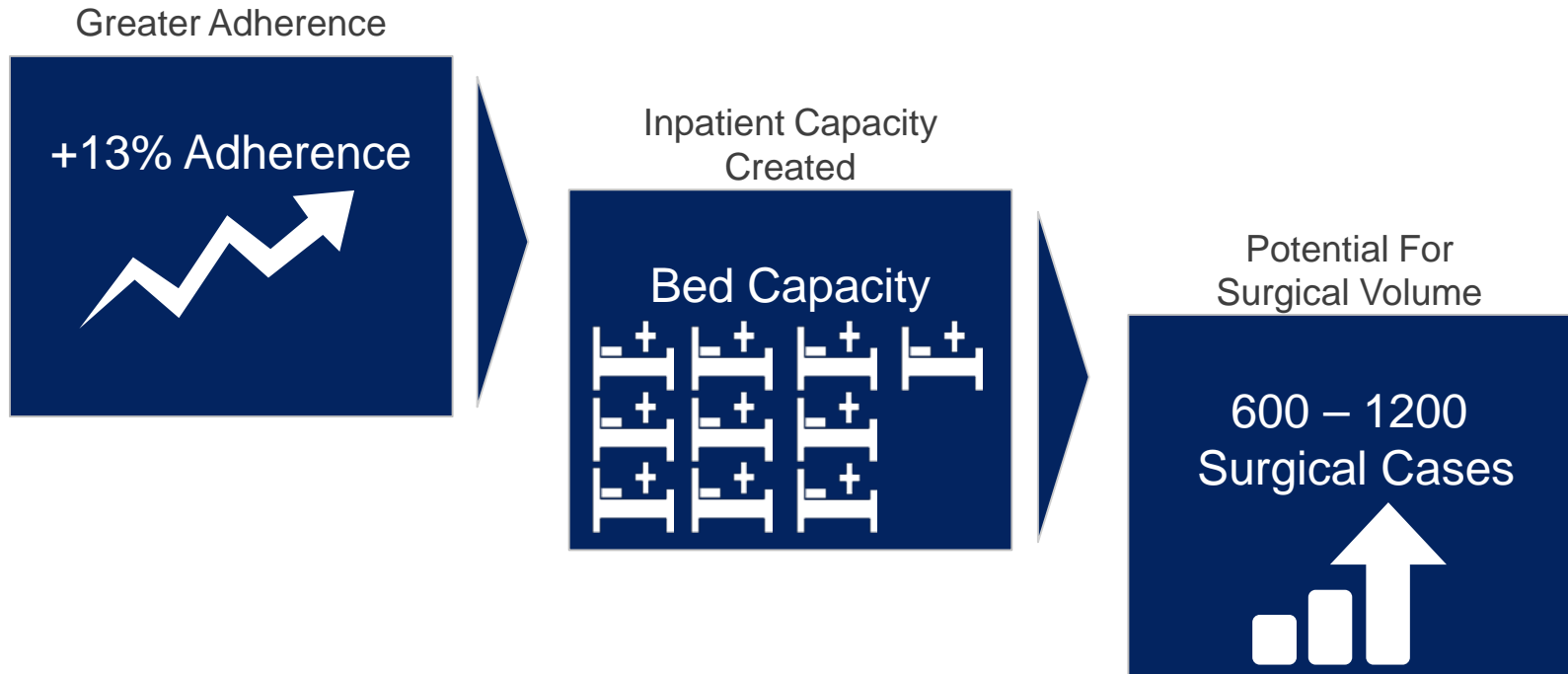
Pathway LOS Adherence By Month, 2016 - 2017



Aug – Dec 2017 saw 5 consecutive months of record LOS adherence



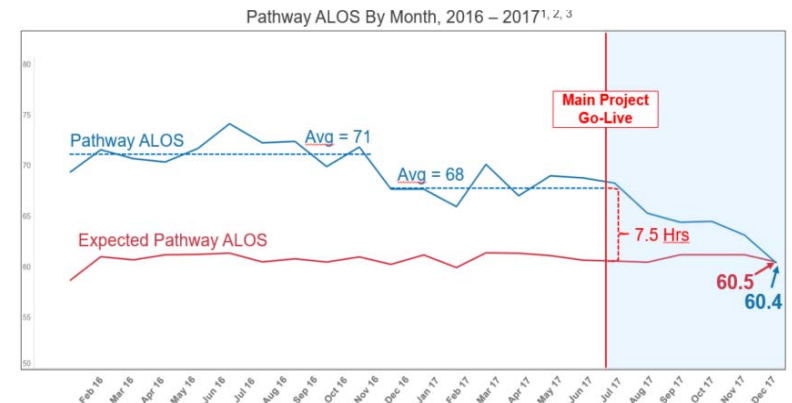
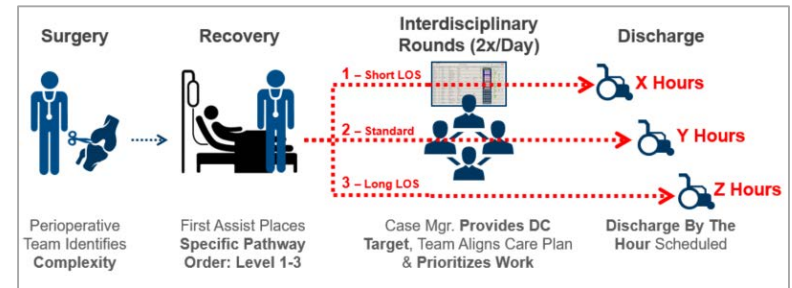
Greater Pathway Adherence Has Created Capacity For Additional Surgical Cases



Recap: HSS Has Created A Pathway Management System

- HSS developed and hardwired a cohesive system to manage each patient by their pathway
 - Pathway segmentation
 - Discharge scheduling with LOS goals
 - Supporting department work queues

- Overall Results:
 - +13% net pathway LOS adherence
 - Represents a 33% improvement
 - 5 consecutive months of record rates
 - 10% ALOS decrease
 - 6.5 hour pathway LOS decrease
 - Additional bed capacity for surgical cases
 - 600-1200 cases



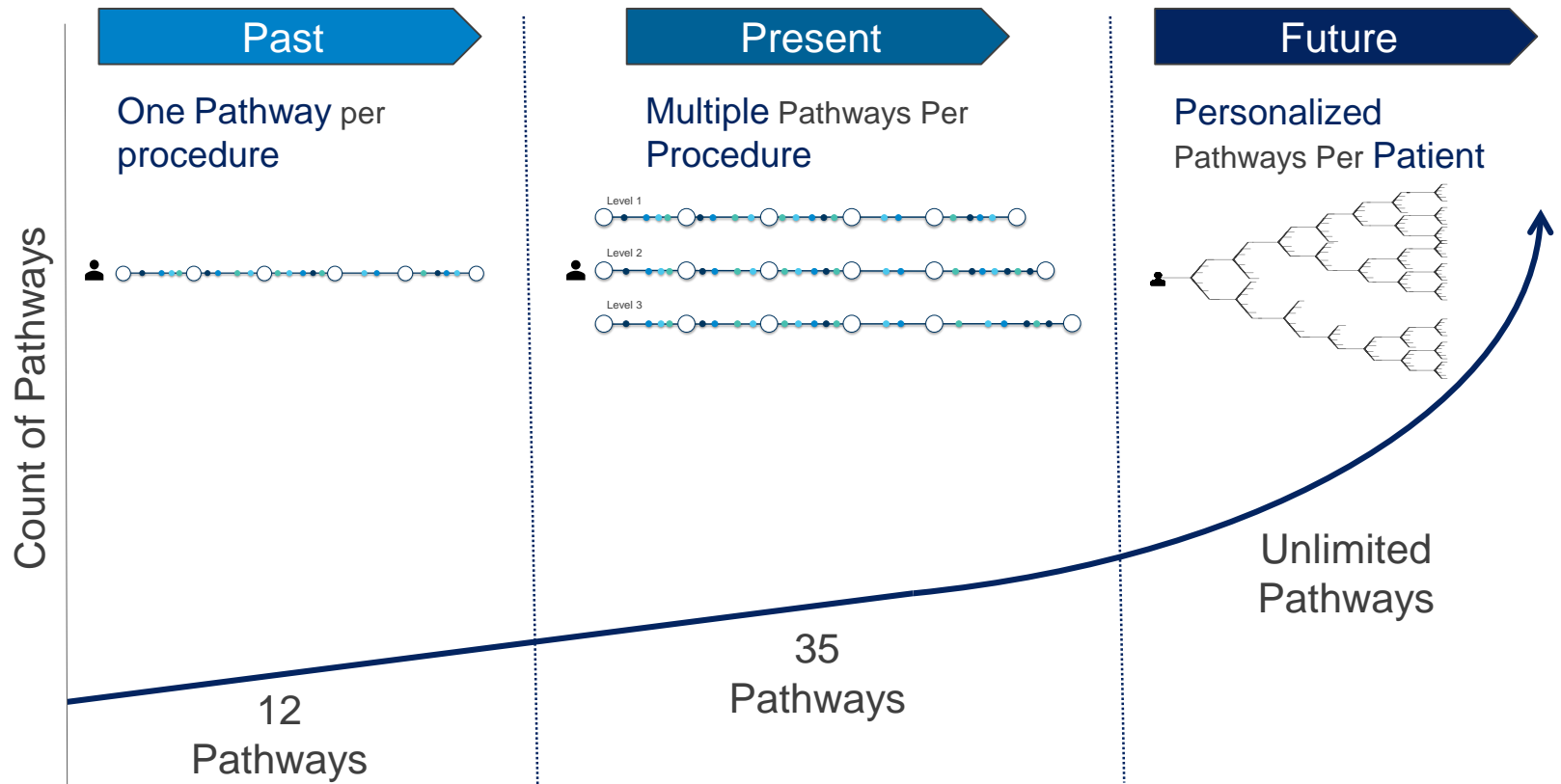
Despite improvements, large opportunities exist for 2018 and beyond

Next Steps



HSS

Building On Past Work, HSS Pathways Will Become More Personalized



Personalized pathways will require more clinical coordination, flexible operations, and rapid development cycles

Soon, Pathway Development Will Be Driven By A Steering Committee

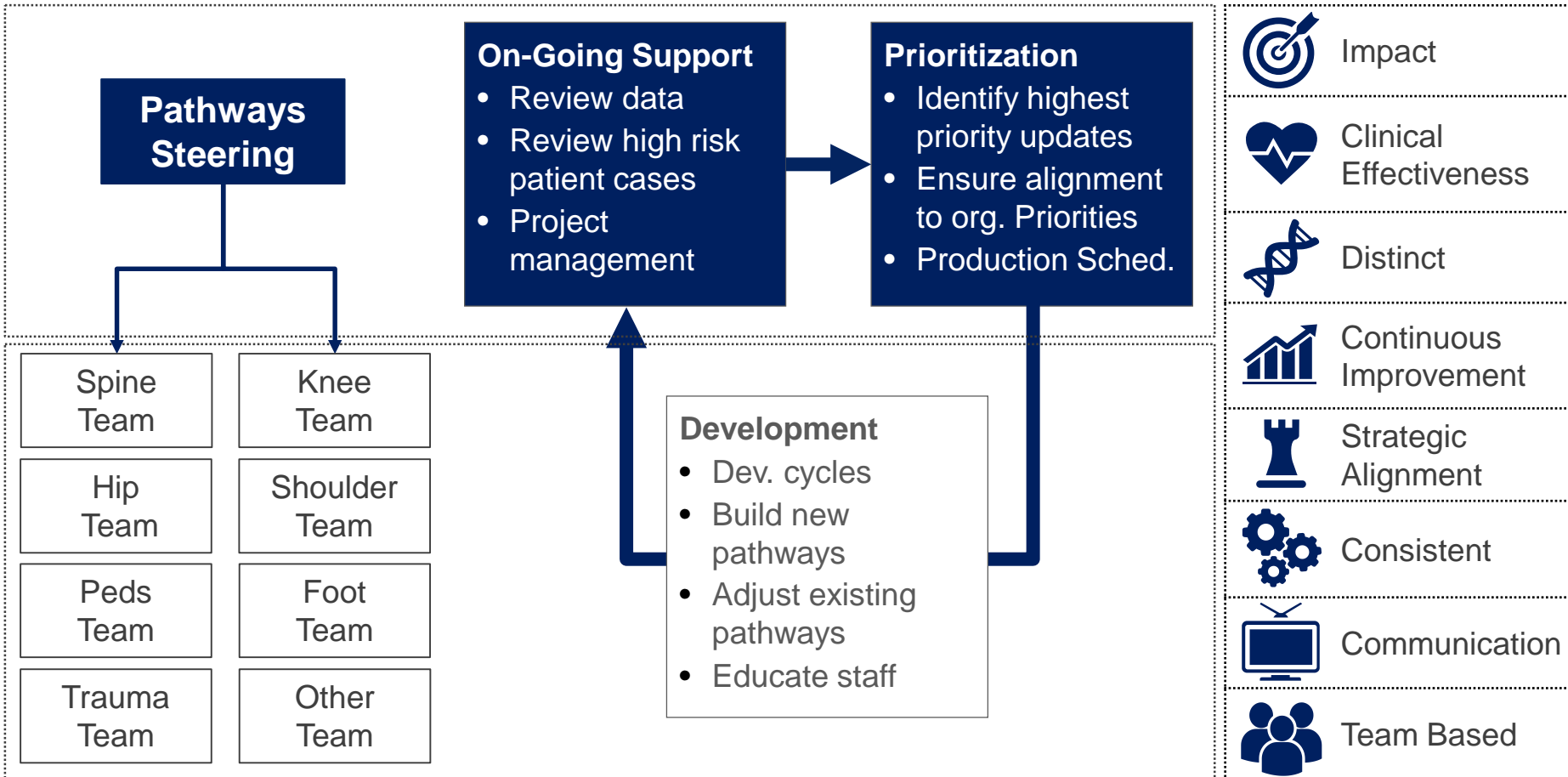
Structure



Process



Output



Lessons Learned

- Gather prevailing hypotheses and use data to A) separate myth from fact and B) identify focus for change
- Use design thinking with a trusted interdisciplinary team to create engagement and find ideal solutions
- Rank your solutions against the original problem (data)
- Be creative with your EMR: The perfect solution may not be feasible but a “better” state is always possible
- Communication never ends: Ensure all stakeholders have the opportunity to evaluate the team’s solutions before moving forward
- Consider what might happen if you are too successful (e.g., budget impact)
- Systemic alignment occurs when you establish shared goals that can be operationalized within workflows