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

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Part I: Census Reporting

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Census Reporting 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 Census Report 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

A more accurate and timely census report would support daily capacity planning and execution

Census Notification Process
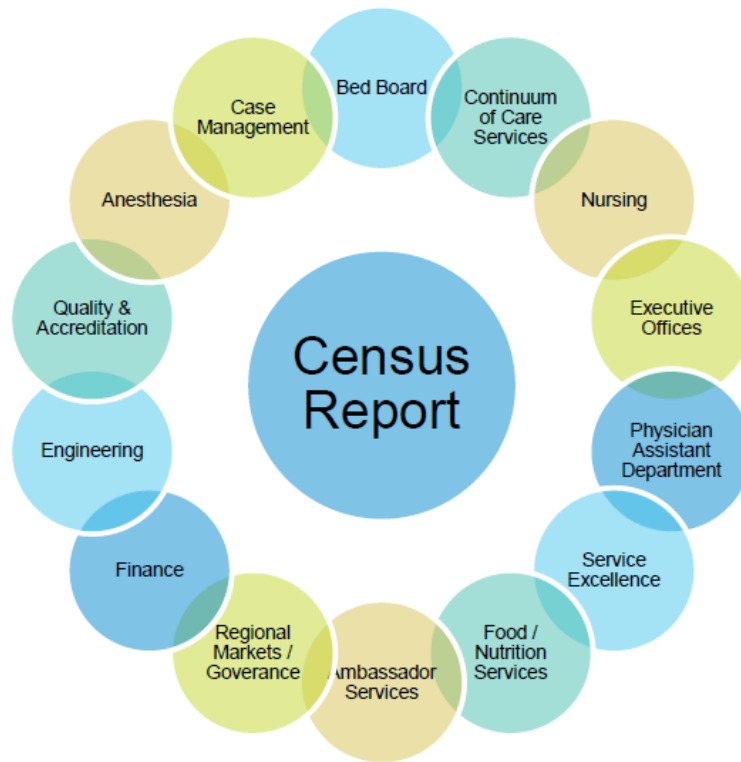
	11:30A	2:30PM	5:00PM	9:00PM
Today's AM Census	149	149	149	149
Scheduled Admits:	58	58	58	58
Emergency IP Admits:	0	1	1	1
AMS Needed Beds	6	9	10	13
Sleep Apnea:	0	1	2	2
Expected Census W/O D/C's (EC)	213	218	220	223
Active Bed Count (BC): 209	197	196	193	194
EC-BC	16	22	27	29
Confirmed Discharges:	23	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 For Improvement

- 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

Plan — **Do** — **Check** — **Act**
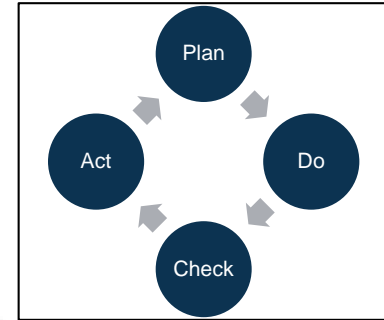
Operational owners, vendor, and IT met to discuss current state workflow and data collection
- Pulled in front-end users
- Talked with end-users about data they provided and how determined
- Scrutinized each data point to understand which we could automate

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

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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%	
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	40.7%	6.6%
August 292016	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

Data Collection

Expected Discharges - Today — Just now

12 Total Conf

7 Total Pend

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

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

Urgent Admits	
12:00p	0
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

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

Confirmed Discharges (Total Conf) From Dashboard	
12:00p	12
2:00p	0
4:50p	0
8:30p	0

Pending Discharges (Total Pend) From Dashboard	
12:00p	7
2:00p	0
4:50p	0
8:30p	0

Discharges Already Departed From Dashboard	
12:00p	0
2:00p	0
4:50p	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)

Legend: ■ Avg RTP to Assigned   ■ Avg Assigned to Bed Ready   ■ Avg Bed Ready to Occupied
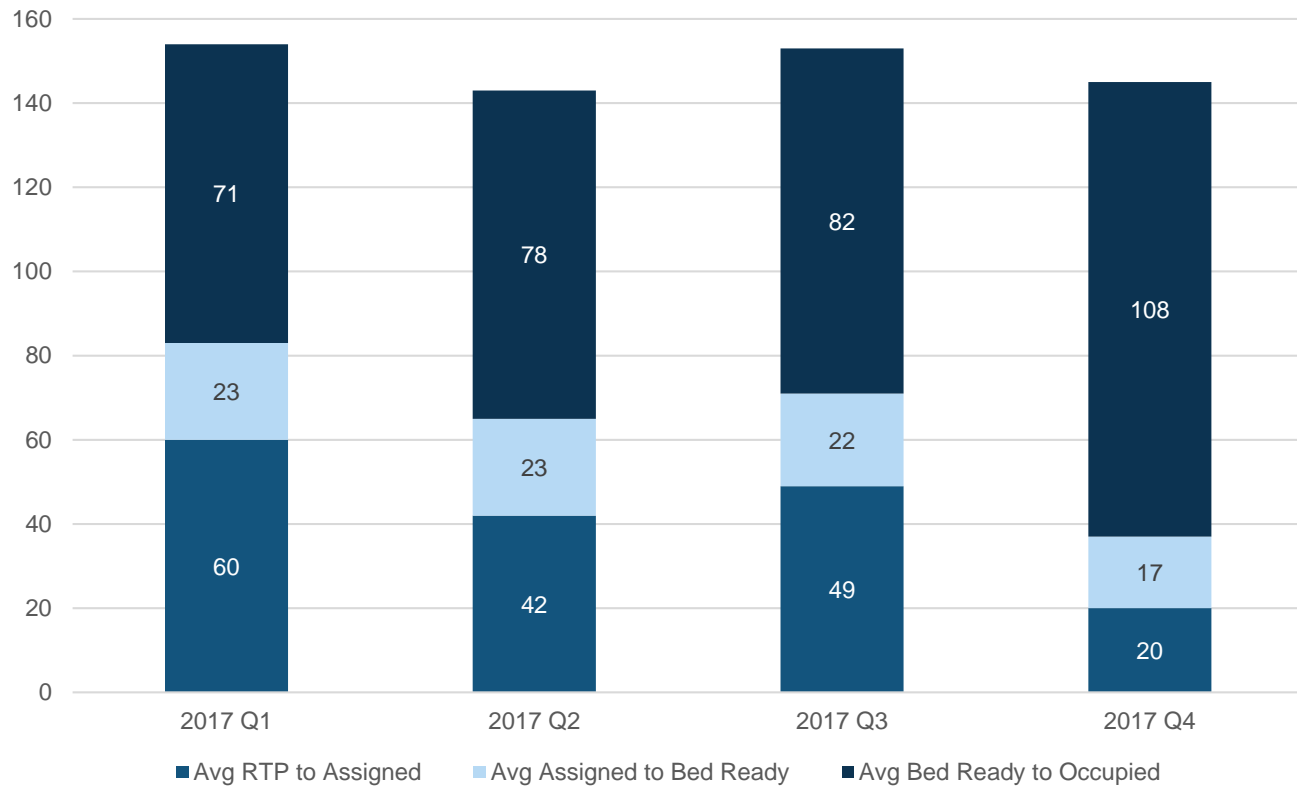
Transfer out of the PACU depends on inpatient capacity

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Part II: Clinical Pathway Management

Kelli Nelson

Director, Clinical Applications

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

Pathway performance is measured as "Pathway LOS Adherence"

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

Pathway LOS Goal

Surgery　　　　　　　　　　　　　　Discharge

Surgery　　　　　　　　　　　　　　　　　　Discharge

Adhered　　　　　　　　　　　　　　Did Not Adhere
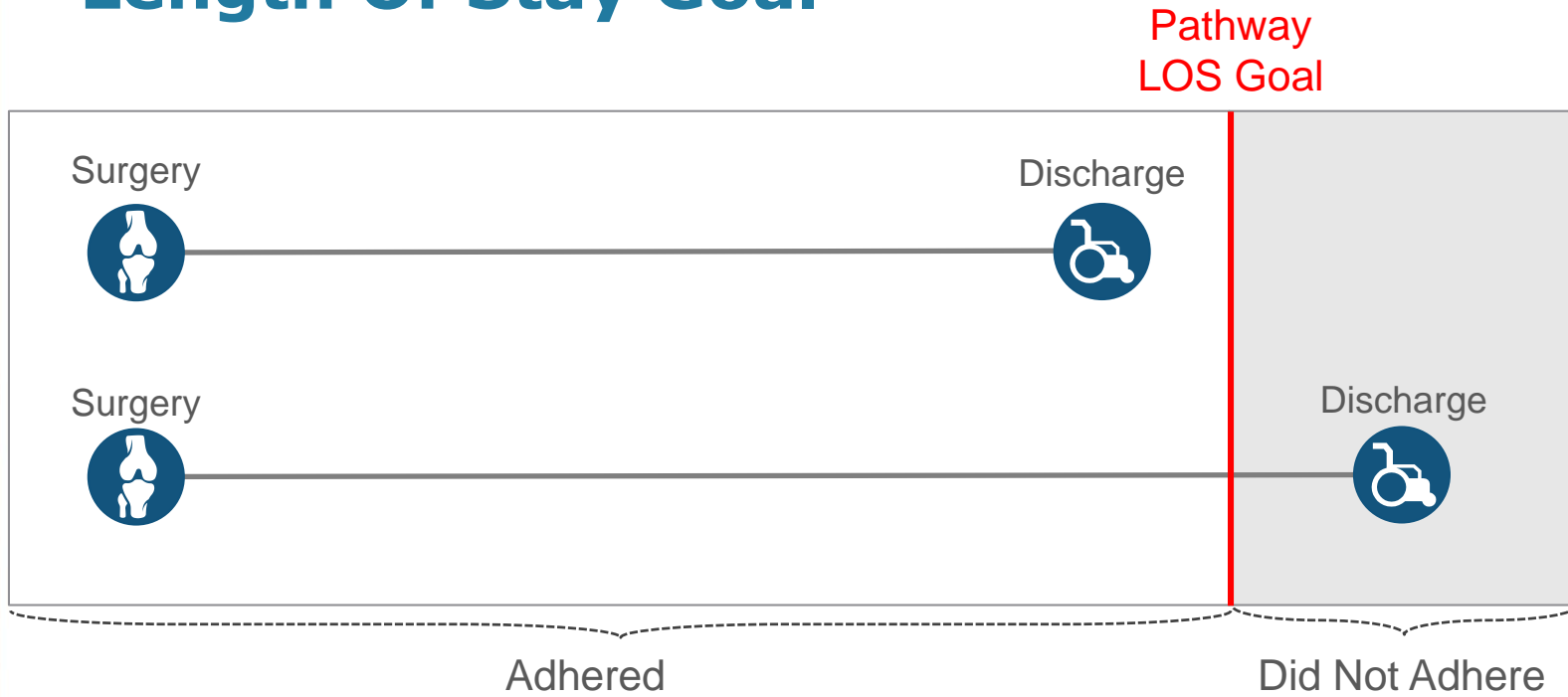
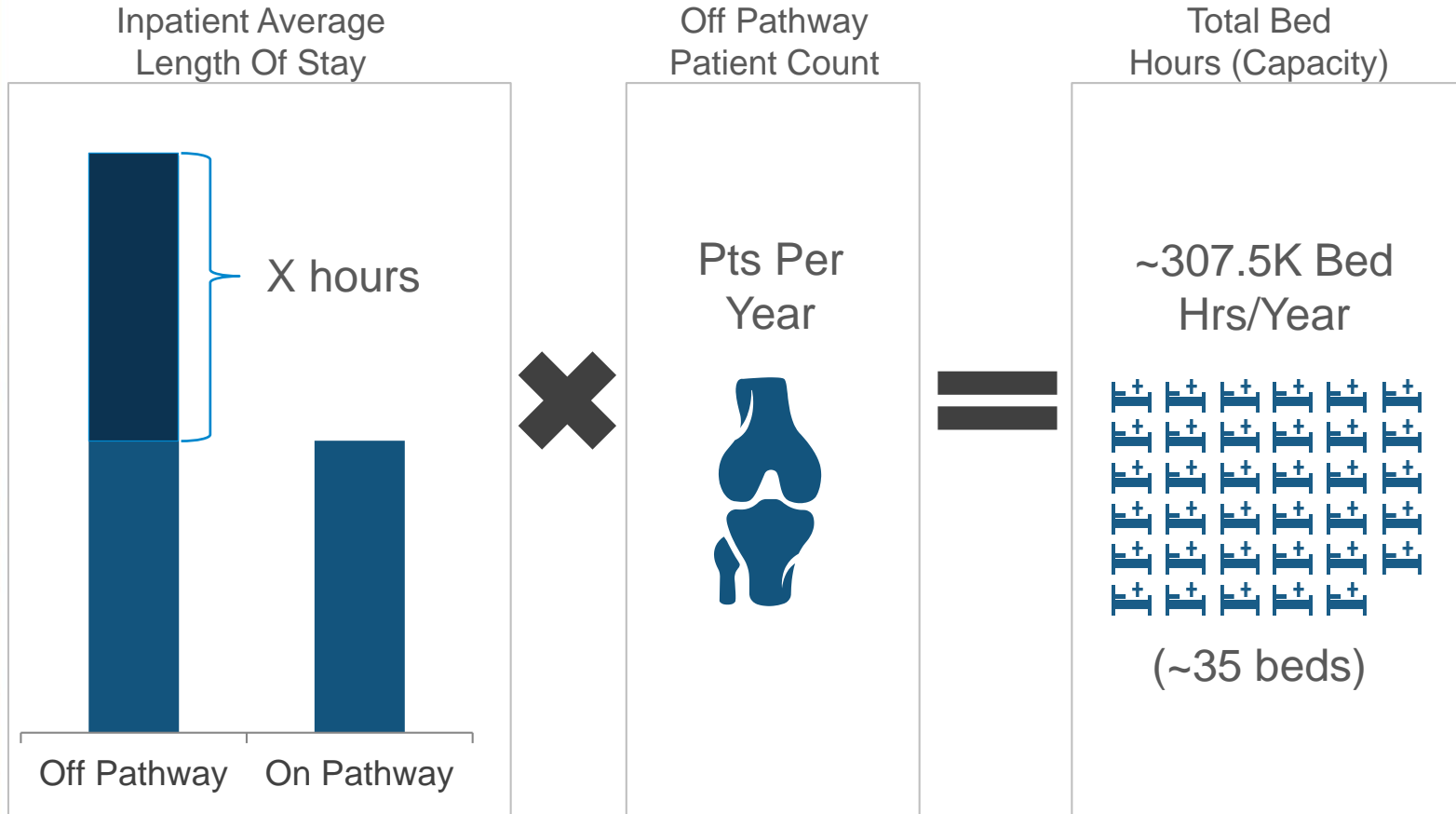**At HSS, there is no margin of error in LOS Adherence**

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

Pathway LOS Adherence By Month, 2016

Average = 40%
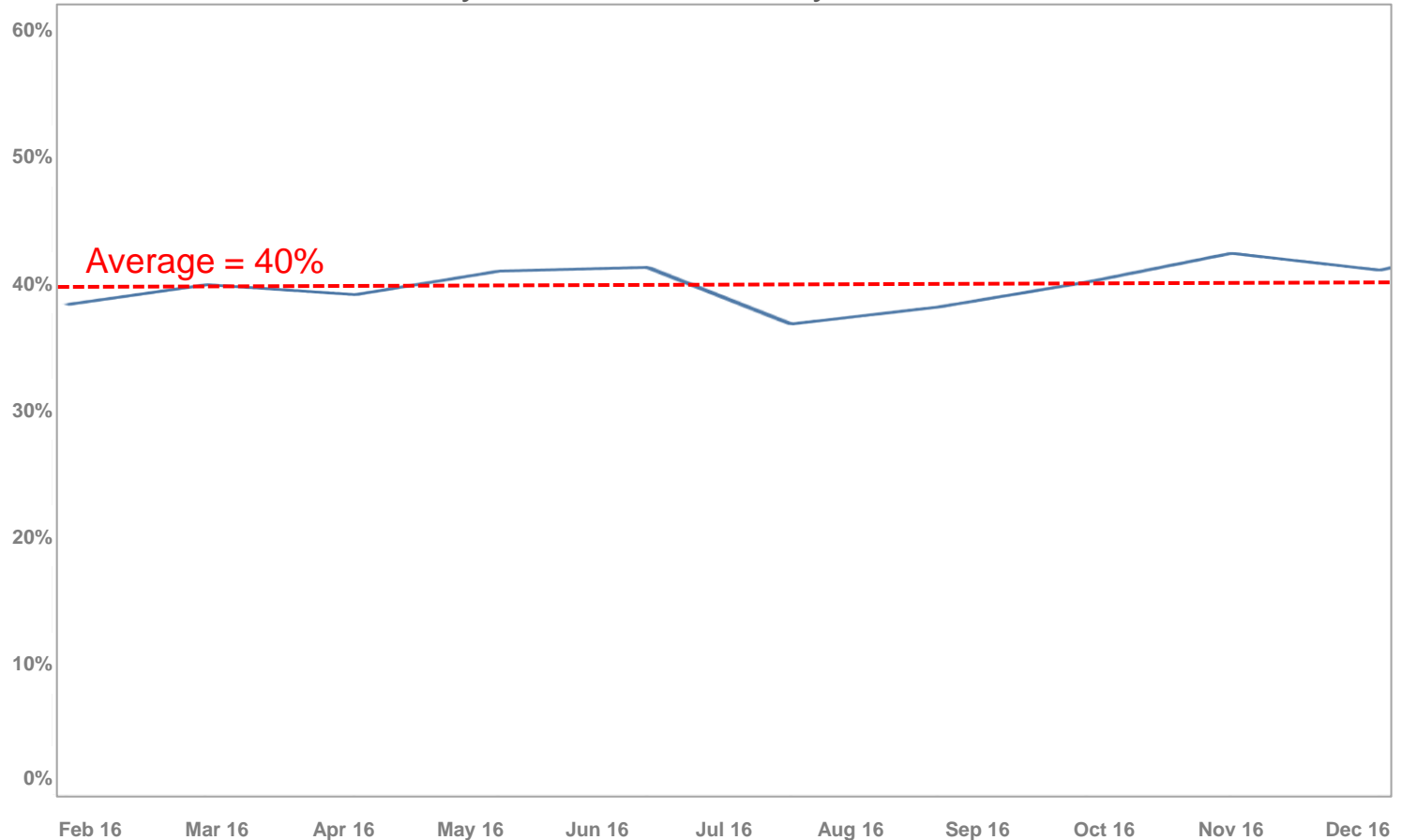
For every 10 patients, 4 adhered to their pathway

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

Inpatient Average Length Of Stay
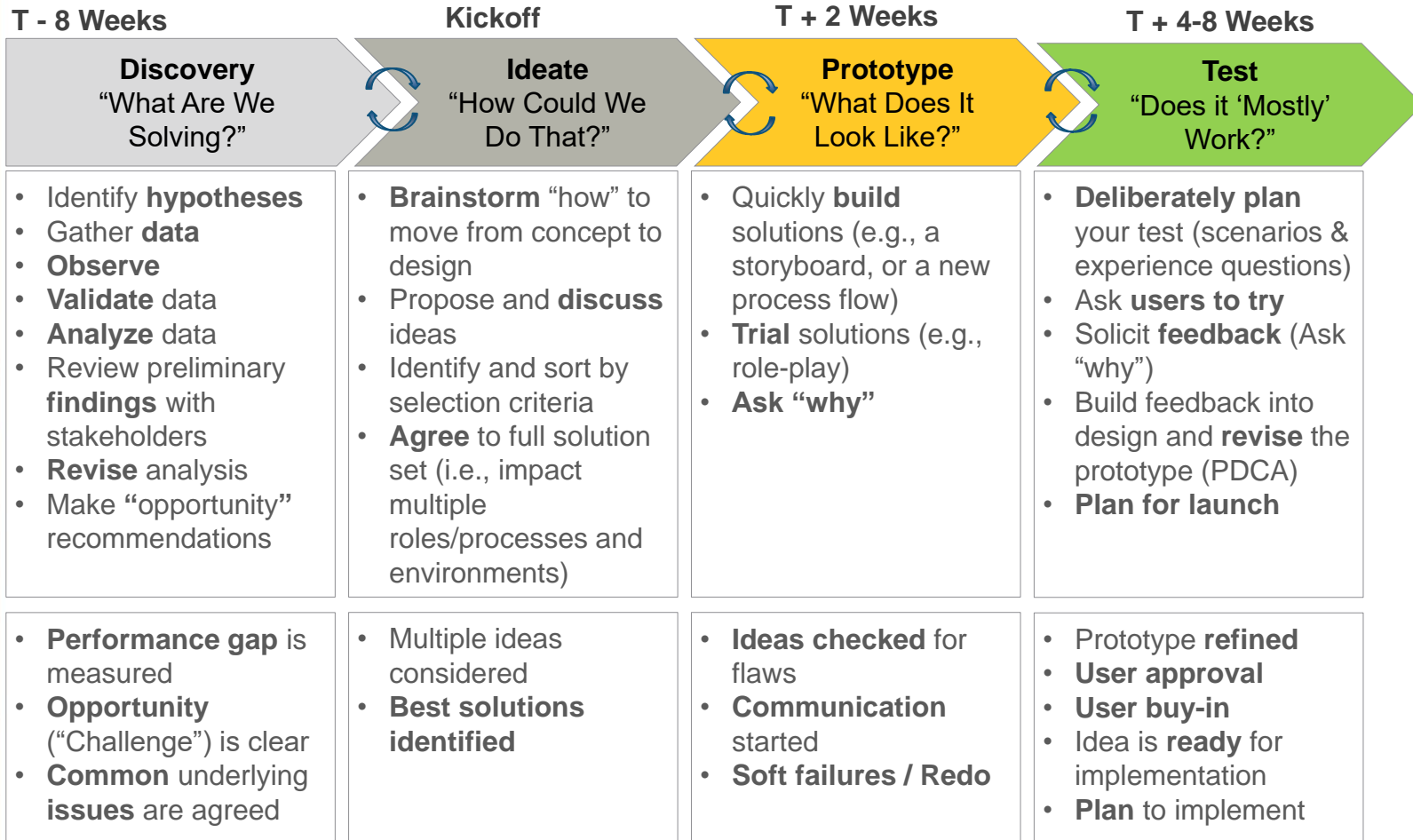
X hours

Off Pathway | On Pathway

✕

Off Pathway Patient Count

Pts Per Year

=

Total Bed Hours (Capacity)

~307.5K Bed Hrs/Year

(~35 beds)

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	❑ Develop/refine reporting and measurement ❑ Determine top 5 contributors to adherence and isolate clinical vs. non clinical (operational) causes ❑ Recommend new pathways for development and pathways changes to achieve better adherence (e.g., LOS Targets) ❑ Establish action plans and implement operational changes (e.g., "Pathway Clock" workflow design)

	#	Description	Baseline	Target	Standard
Metrics	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 3. Staff satisfaction with plan of care documentation 2. Clinically appropriate length of stay 3. Decreased costs for HSS and patient-family 4. Patient satisfaction and quality of care

	Leadership	Team	Ad Hoc
Team Members	• **Sponsor(s)** • **Ops. Owner(s)** • **Op. Ex.**	• **Case Management** • **Nursing** • **Nutrition** • **Physician Assistant** • **Physician** • **Pharmacy** • **Physical Therapy** • **Information Technology** • **Value Management**	• **Informatics** • **Patient Care Directors** • **Physicians**

The Project Team Followed A Design Thinking Approach

T - 8 Weeks	Kickoff	T + 2 Weeks	T + 4-8 Weeks
Discovery "What Are We Solving?"	**Ideate** "How Could We Do That?"	**Prototype** "What Does It Look Like?"	**Test** "Does it 'Mostly' Work?"

Activities

• Identify **hypotheses** • Gather **data** • **Observe** • **Validate** data • **Analyze** data • Review preliminary **findings** with stakeholders • **Revise** analysis • Make **"opportunity"** recommendations	• **Brainstorm** "how" to move from concept to design • Propose and **discuss** ideas • Identify and sort by selection criteria • **Agree** to full solution set (i.e., impact multiple roles/processes and environments)	• Quickly **build** solutions (e.g., a storyboard, or a new process flow) • **Trial** solutions (e.g., role-play) • **Ask "why"**	• **Deliberately plan** your test (scenarios & experience questions) • Ask **users to try** • Solicit **feedback** (Ask "why") • Build feedback into design and **revise** the prototype (PDCA) • **Plan for launch**

Outcomes

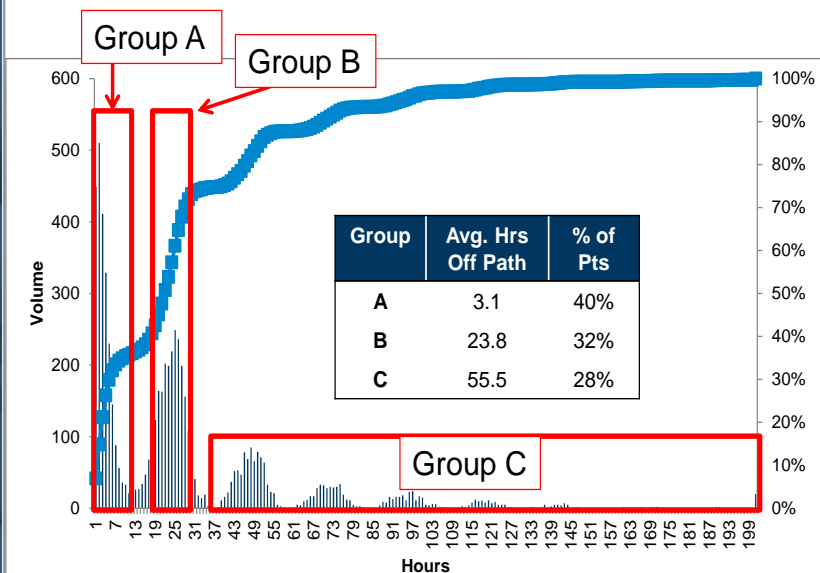|			
• **Performance gap** is measured • **Opportunity** ("Challenge") is clear • **Common** underlying **issues** are agreed	• Multiple ideas considered • **Best solutions identified**	• **Ideas checked** for flaws • **Communication** started • **Soft failures / Redo**	• Prototype **refined** • **User approval** • **User buy-in** • Idea is **ready** for implementation • **Plan** to implement

In this approach, the discovery phase starts with data analysis

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

Among Patients Who Go Off Path, ~72% Are Off By ≤30 Hours
3 Distinct Groups: (A) 0-12 Hrs Off Path, (B) 18-30 Hrs Off Path, (C) All Others
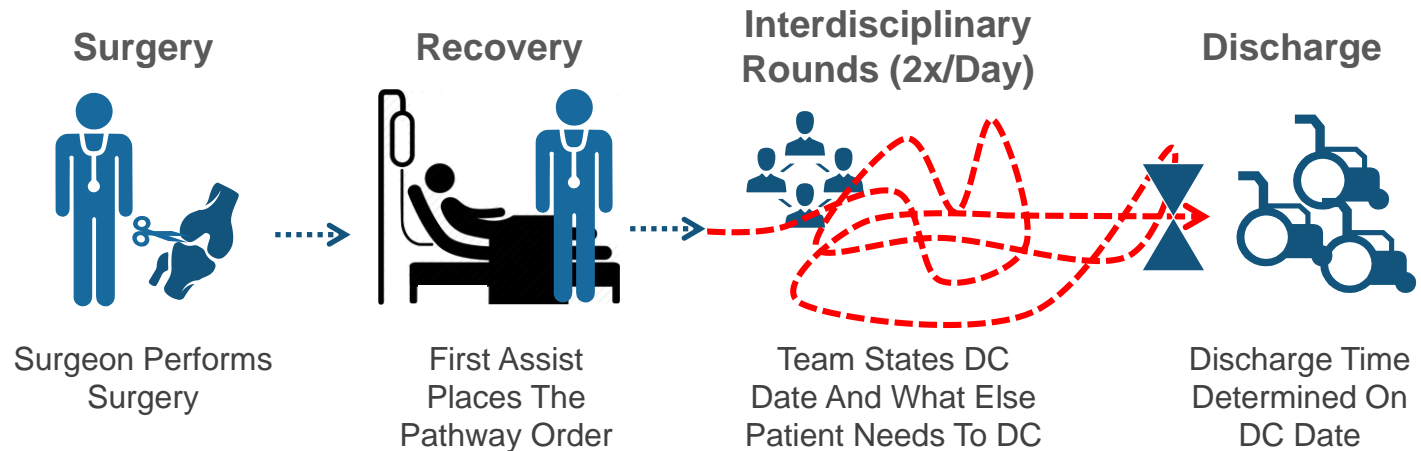
Group A

Group B

Group C

Group	Avg. Hrs Off Path	% of Pts
A	3.1	40%
B	23.8	32%
C	55.5	28%

Volume (axis: 0, 100, 200, 300, 400, 500, 600)
Hours (axis: 1, 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103, 109, 115, 121, 127, 133, 139, 145, 151, 157, 163, 169, 175, 181, 187, 193, 199)
Percentage (axis: 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%)

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

- **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

Surgery

Recovery

Interdisciplinary Rounds (2x/Day)

Discharge

Surgeon Performs Surgery

First Assist Places The Pathway Order

Team States DC Date And What Else Patient Needs To DC

Discharge Time Determined On DC Date

Key Problems	Significance
Pathways "one size fits all"	• 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	• 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

Surgery

Recovery

Interdisciplinary Rounds (2x/Day)

Discharge

1 – Short LOS → **X Hours**

2 – Standard → **Y Hours**

3 – Long LOS → **Z Hours**

Perioperative Team Identifies **Complexity**

First Assist Places **Specific Pathway Order: Level 1-3**

Case Mgr. **Provides DC Target**, Team Aligns Care Plan & **Prioritizes Work**

Discharge By The Hour Targeted
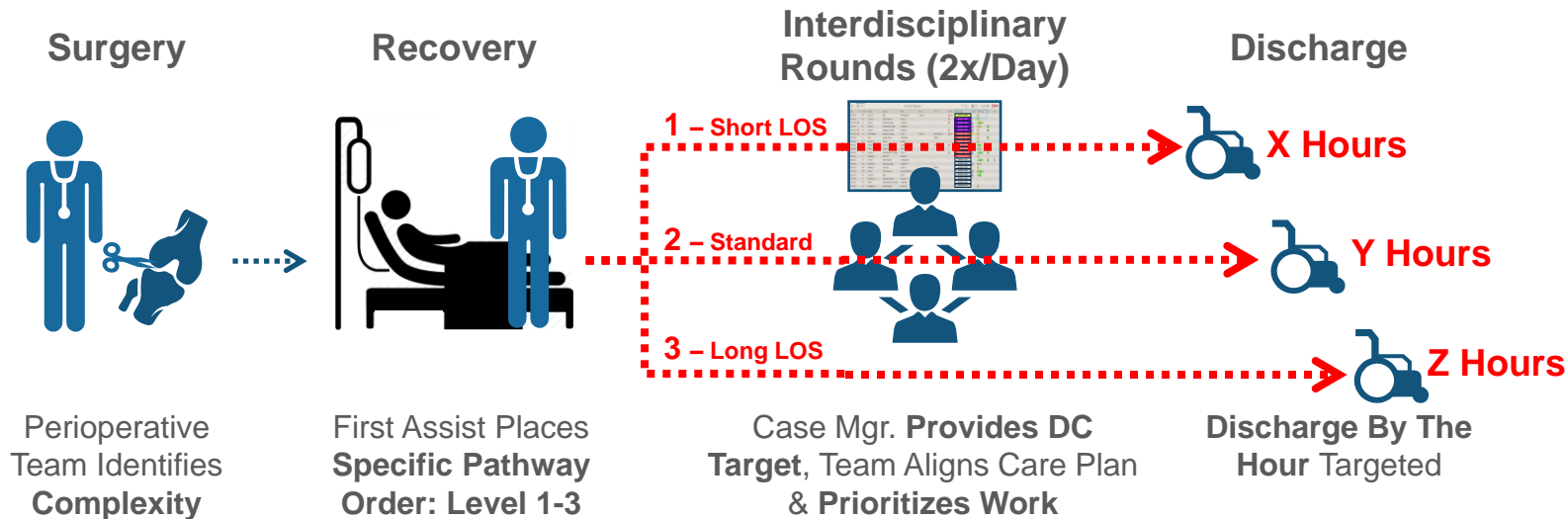
Key Insights

- 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

2 Pathway Order Selection

3 Expected Discharge Date/Time

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

2 IPOC Panel

3 TV Display

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

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

HSS Rounding Standard

	Question	Responsible	Words That Work
Identify	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."
Disposition	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."
Obstacles	Are they progressing toward their disposition? What are the remaining barriers?	RN PT PT RD Pharm.D. Case Mgr.	"...d is healing nicely." "...ed 50x2 and is ...n." RD: "Her diet can be advanced to regular." Case Mgr: "Home care is arranged."
Change	Is it possible to discharge the patient earlier/later? Should the disposition be changed?	PCD	"She's doing well. Is there an opportunity to move her to an earlier discharge? What's the best disposition we could achieve?"
	IF BARRIERS: What can we do to remove the issue or improve the disposition? Who is gong 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?"
Share	*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

All patients on phlebotomist worklist

Updated Worklist

Patients expected to discharge within 6 hours

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

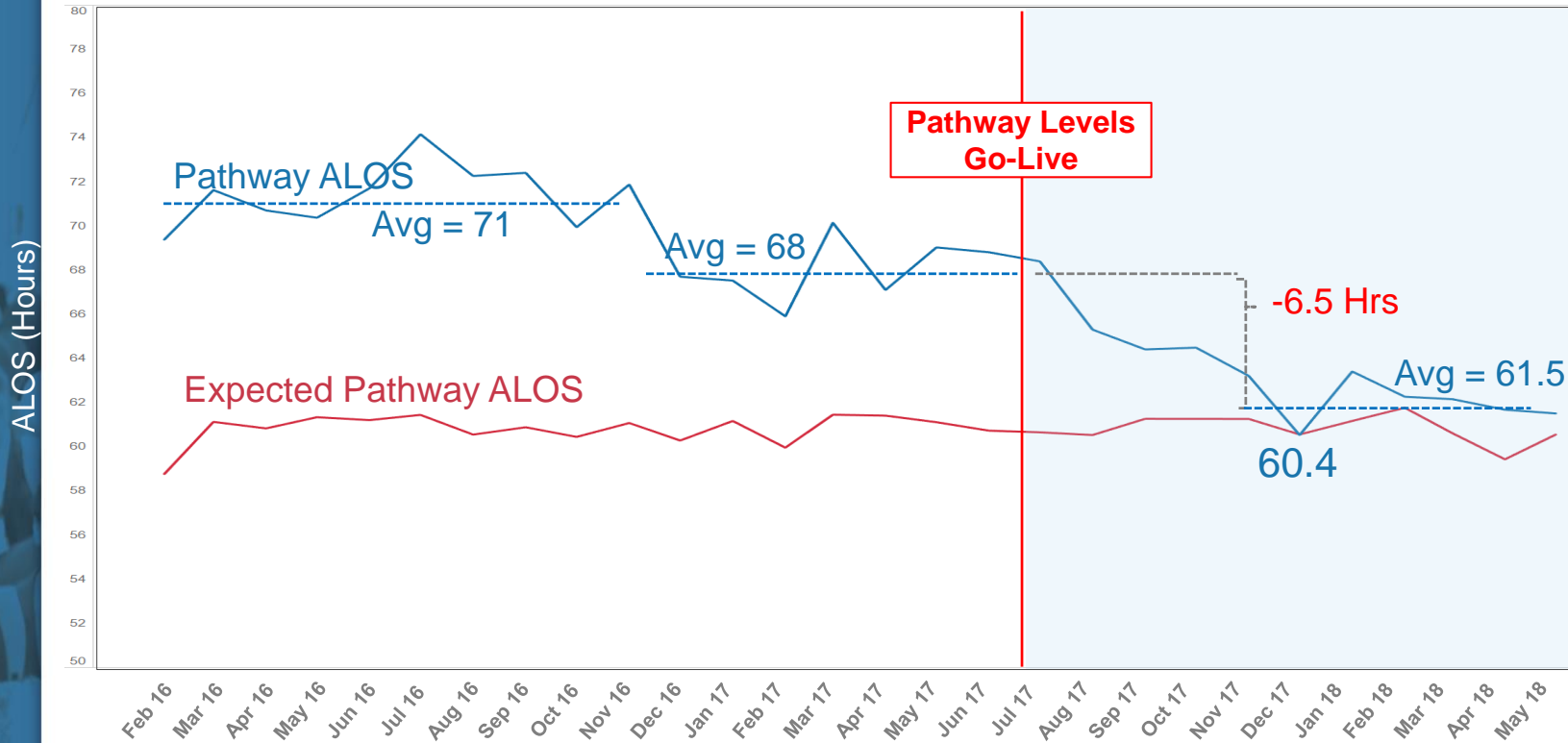# A Performance Dashboard Now Provides Daily Feedback To Each Interdisciplinary Team
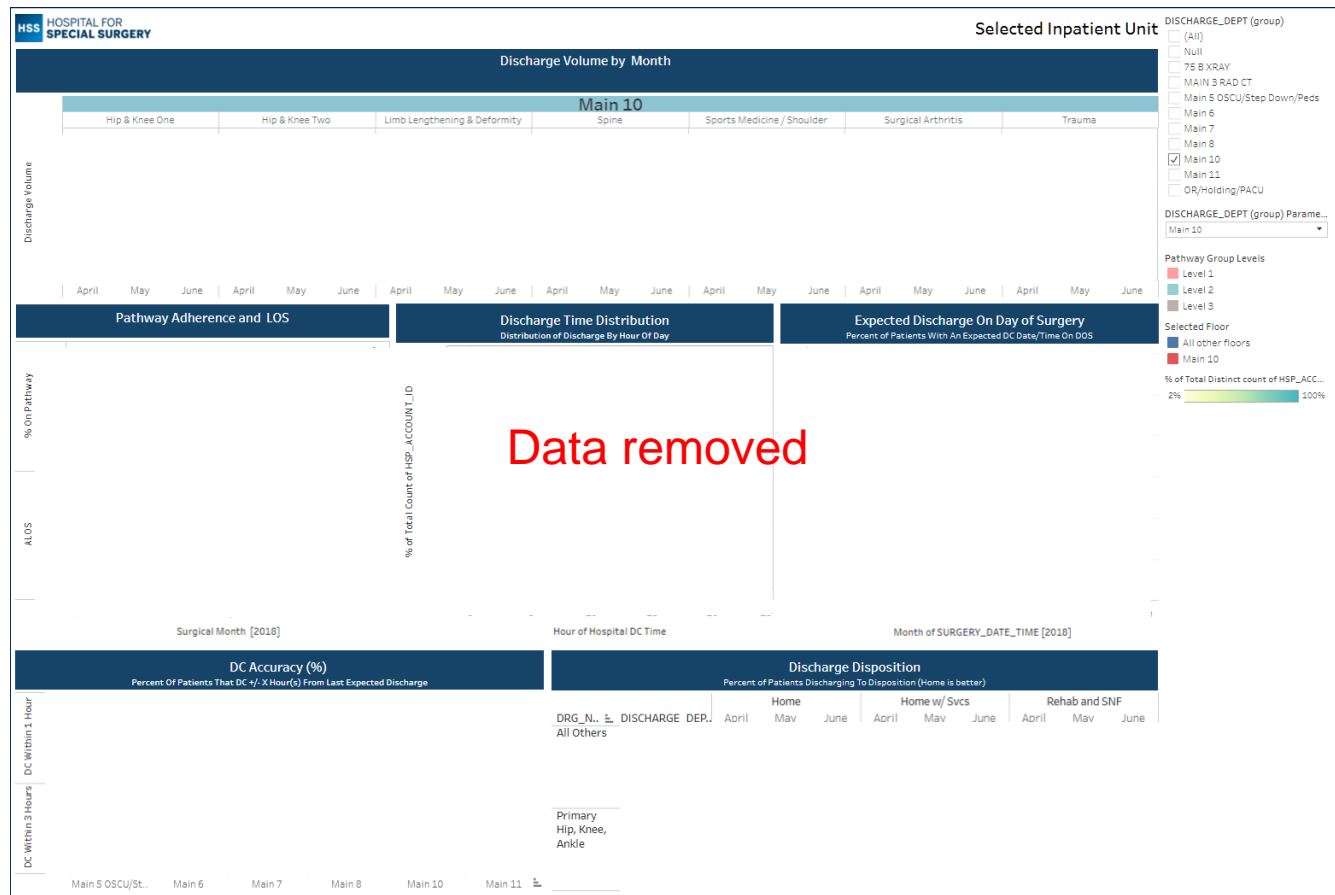
Results

Since Go-Live, Pathway ALOS Has Declined By ~6.5 Hours And Is Now Nearly Equal To The Expected LOS
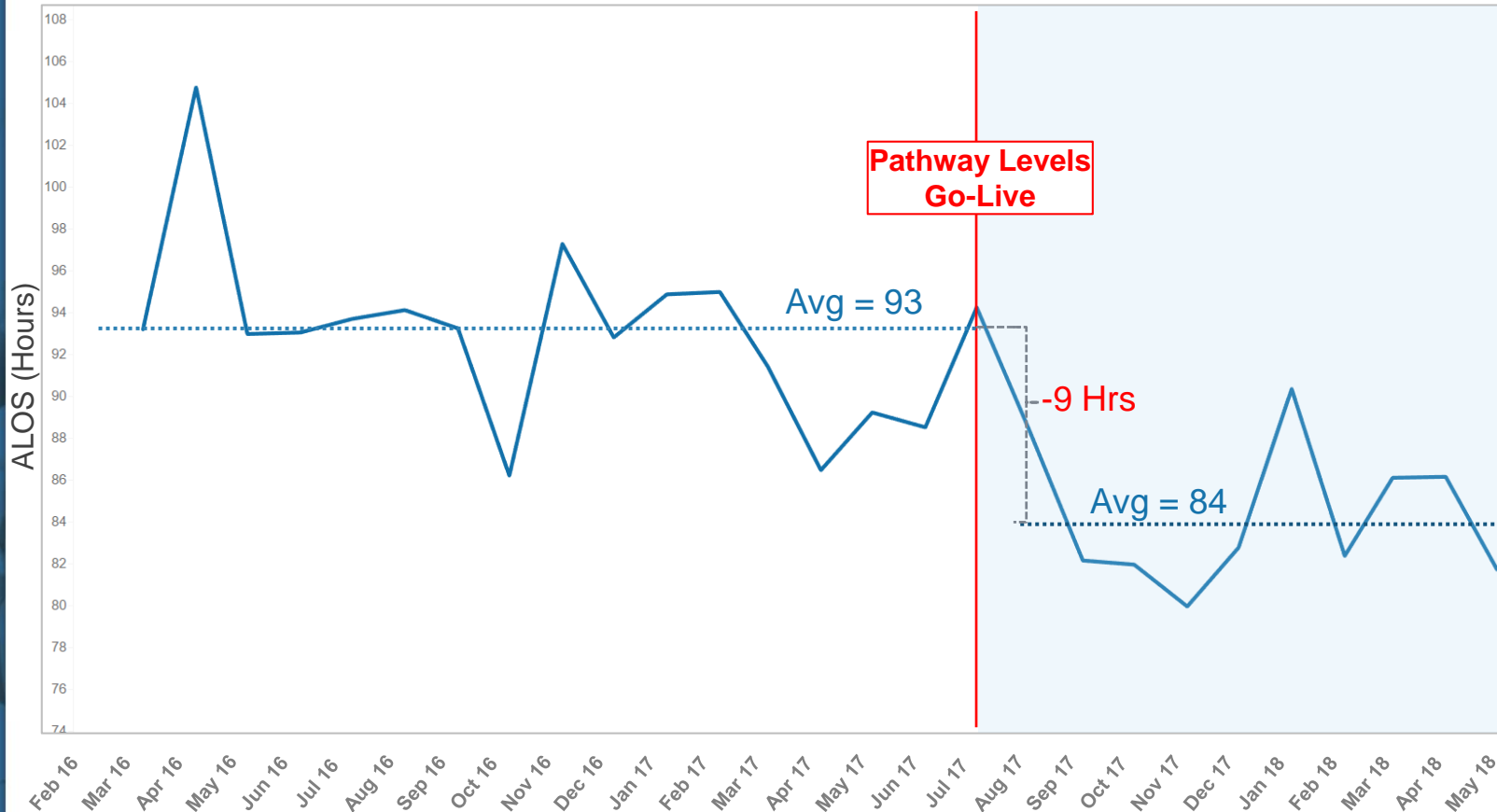
Pathway ALOS By Month, 2016 – 2018 YTD[1, 2, 3]

Pathway ALOS
Avg = 71
Avg = 68

Pathway Levels Go-Live

-6.5 Hrs

Avg = 61.5

60.4

Expected Pathway ALOS

ALOS (Hours)

Delivering the expected ALOS allows for better planning

The ALOS For Complex Pathway Patients Decreased ~9 Hours

Complex Patient ALOS By Month, 2016 – 2018 YTD[1,2]
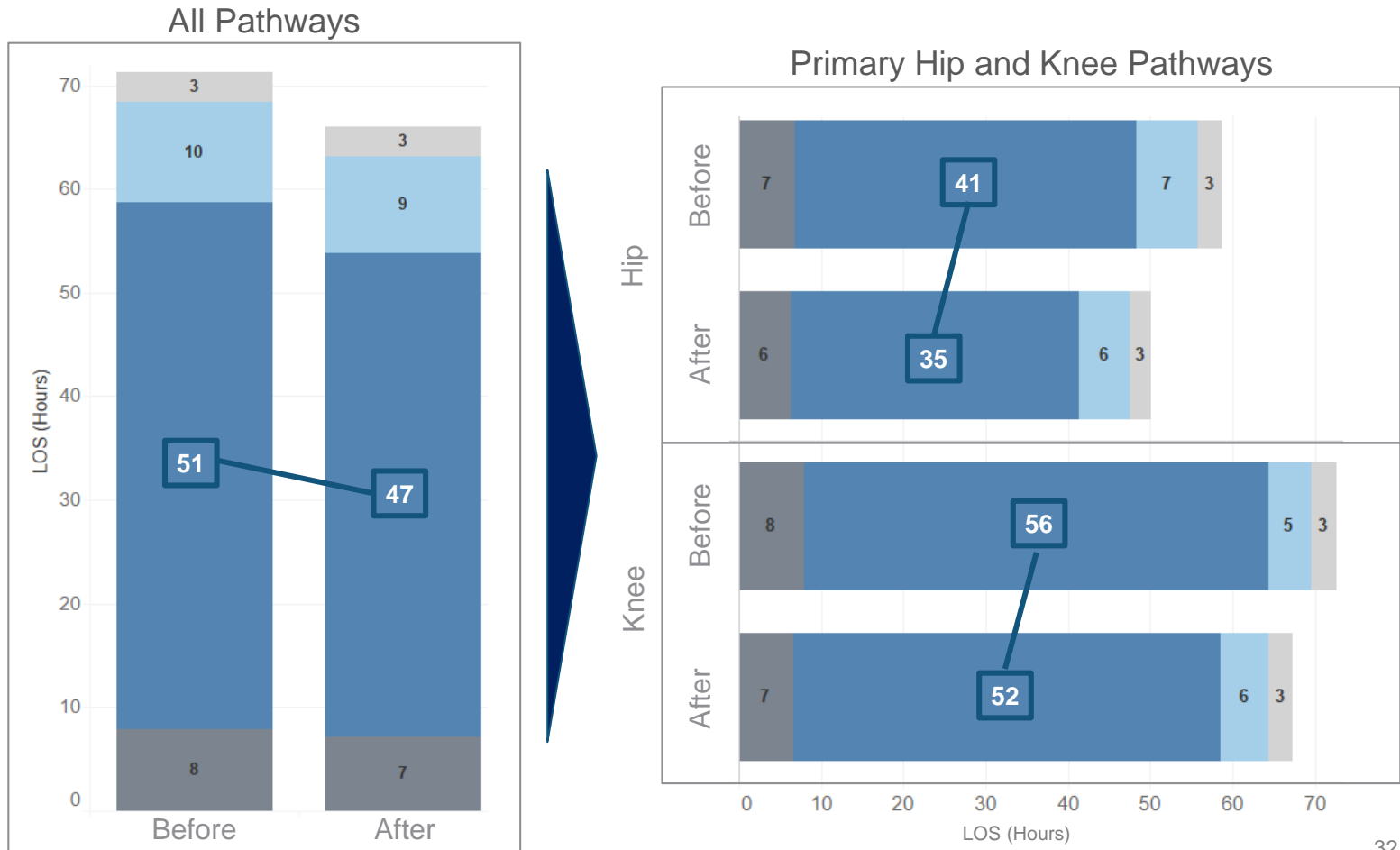

Gaps in care are closing and coordination of care is better, even for most complex of patients

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

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

Legend: ■ PACU ■ IP to Clear ■ Clear to DC Order ■ Discharge

All Pathways

Primary Hip and Knee Pathways

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

Percent of Labs Resulted By Start Of Morning Rounds

Hematology

Chemistry

Worklist Change

+20%

+19%
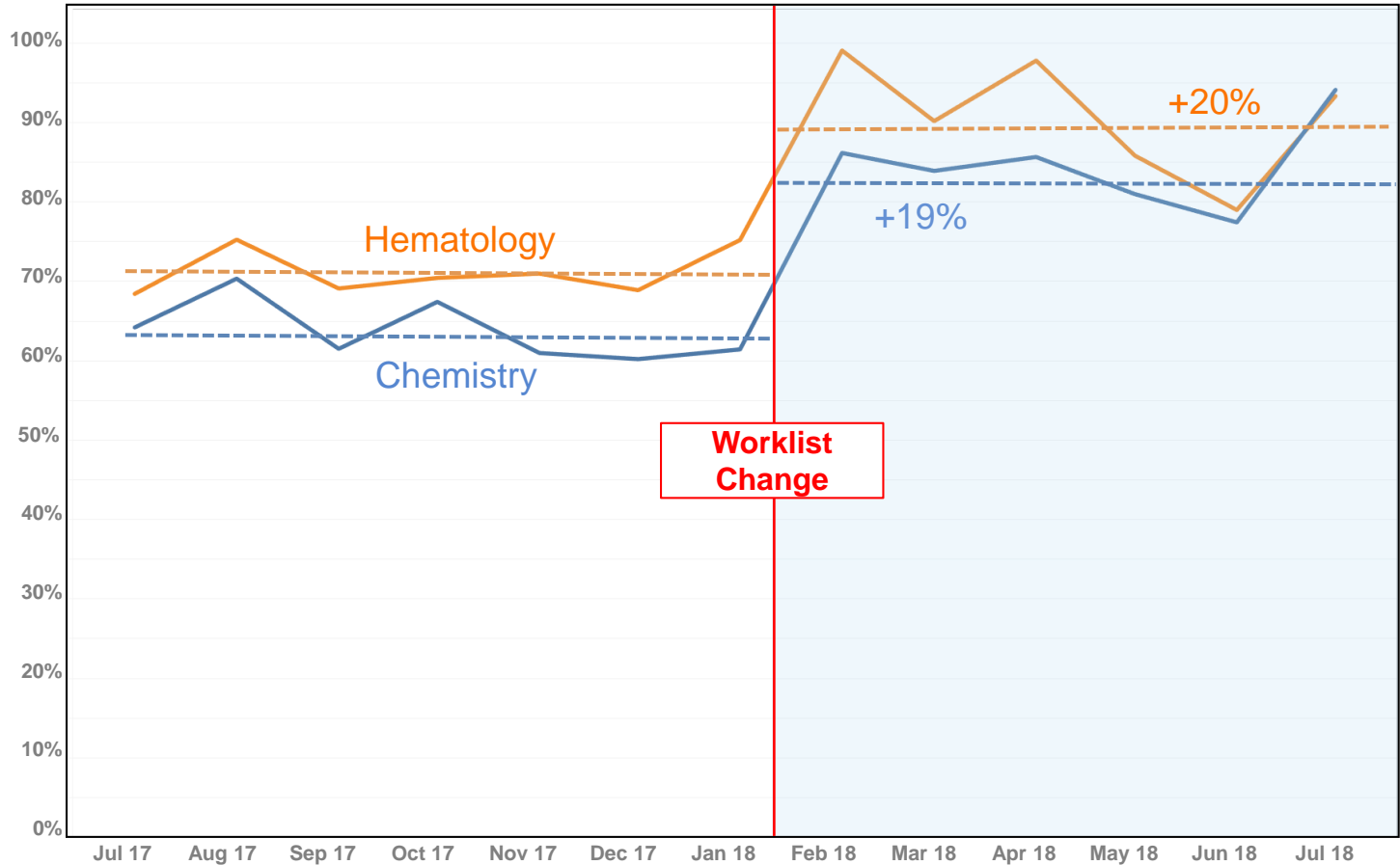
Timely labs allow clinical teams to make decisions regarding discharge and keep patients on pathway

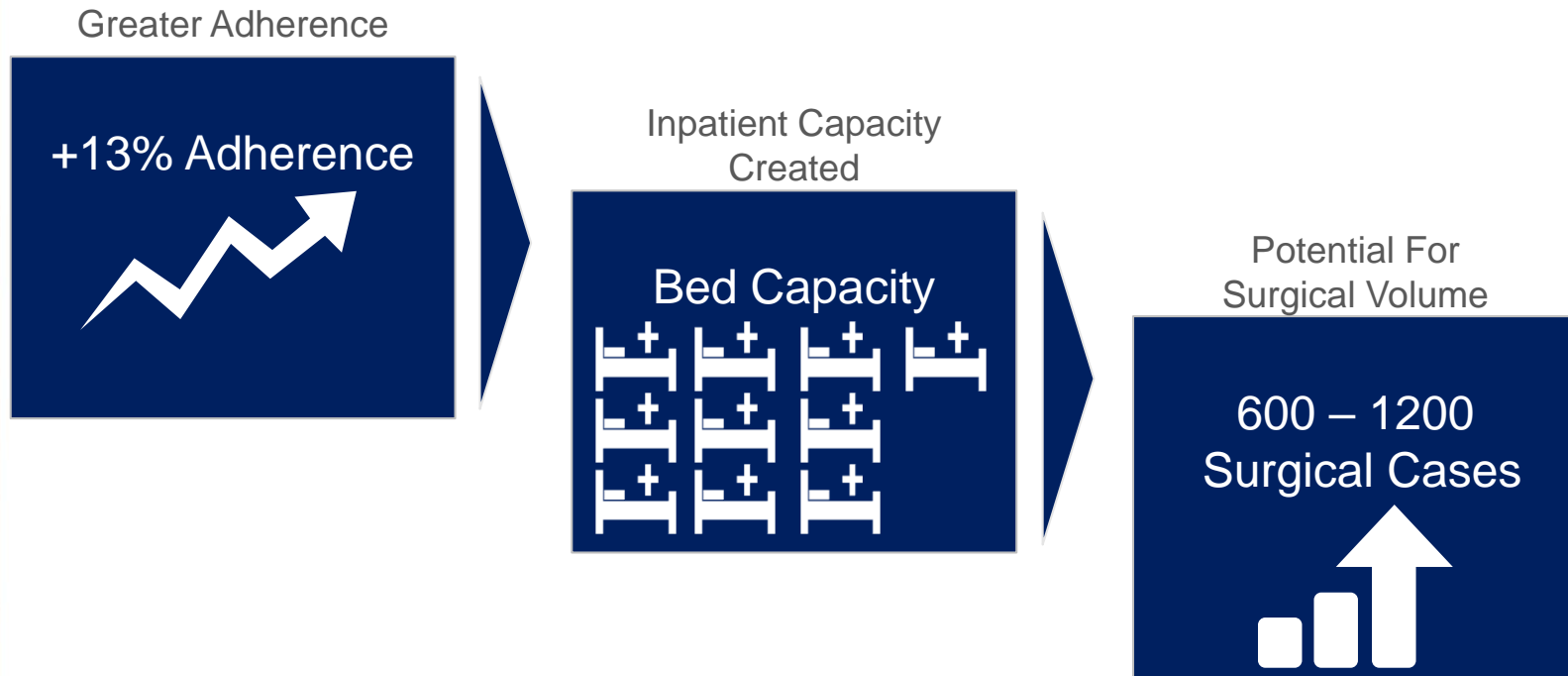# Overall Pathway LOS Adherence Increased By 13%

### Pathway LOS Adherence By Month, 2016 - 2017
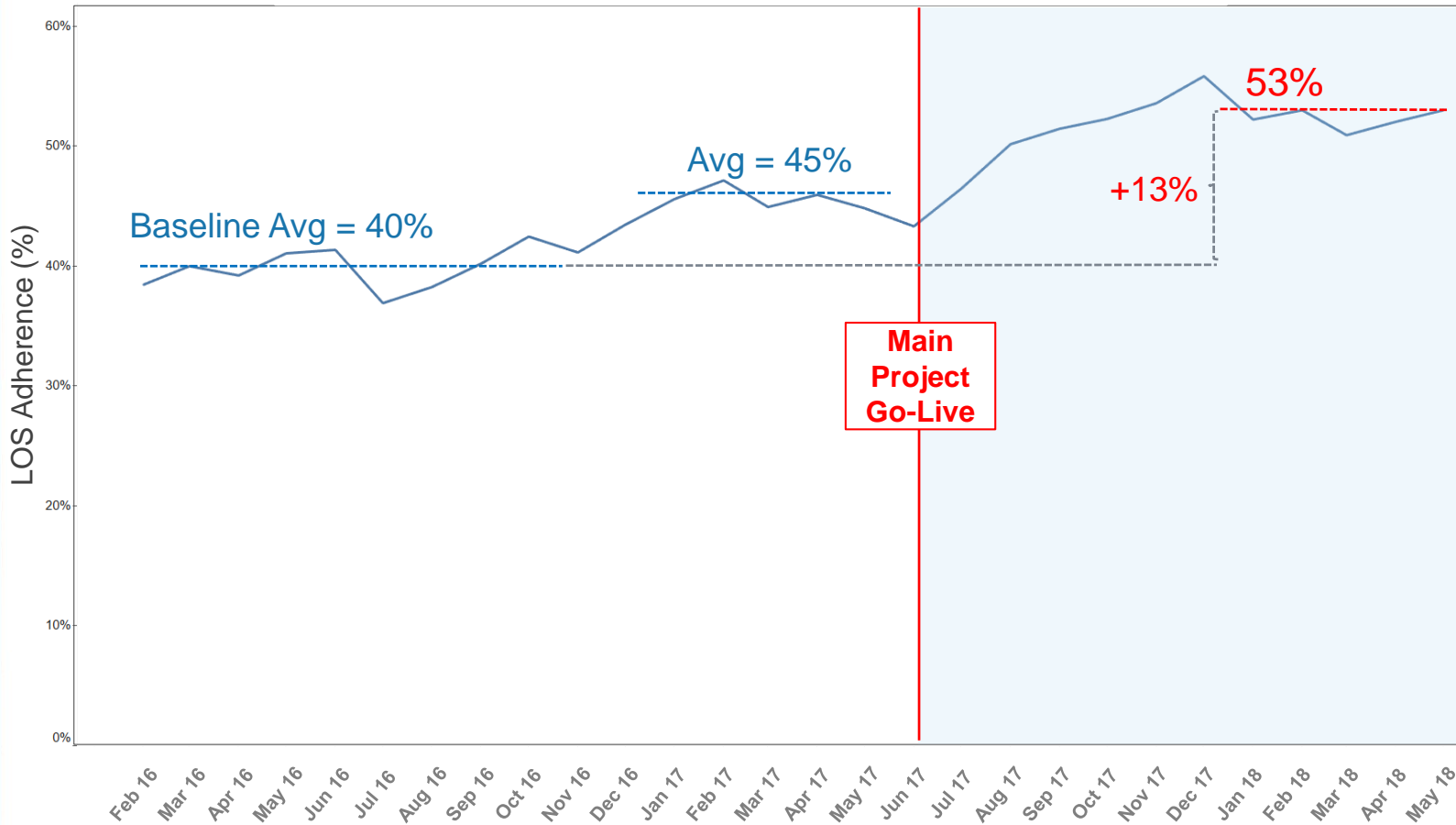
Aug – Dec 2017 saw 5 consecutive months of record LOS adherence

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Greater Pathway Adherence Has Created Capacity For Additional Surgical Cases

Greater Adherence

+13% Adherence

Inpatient Capacity Created

Bed Capacity

Potential For Surgical Volume

600 – 1200 Surgical Cases

Recap: HSS Has Created A Pathway Management System

- HSS developed and hardwired a system to manage each patient by their pathway

  – Pathway segmentation

  – Discharge scheduling with LOS goals

  – Supporting department work queues
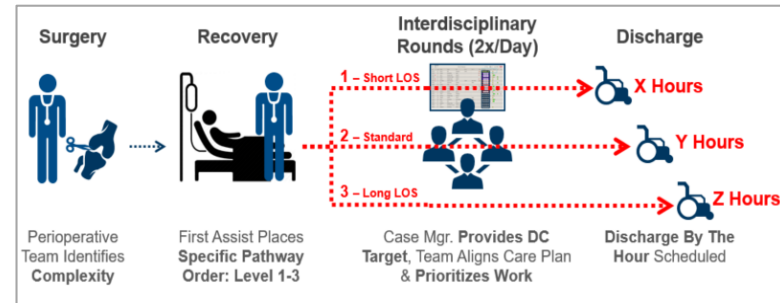
- Overall Results:

  – +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 capacity for 600 - 1200 surgical cases

Pathway ALOS By Month, 2016 – 2017[1,2,3]
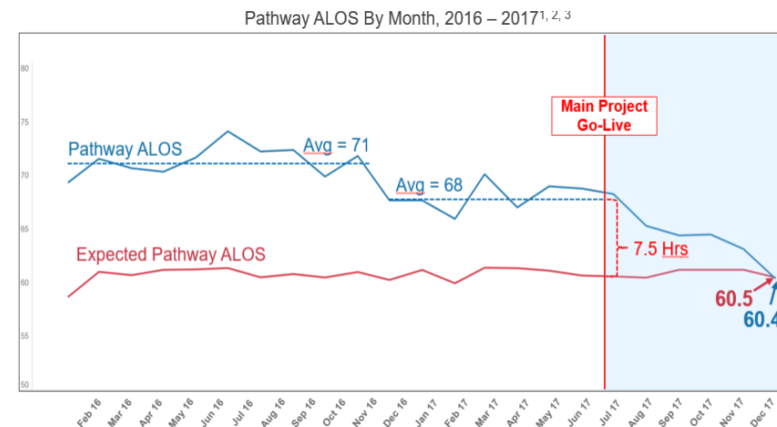
Despite improvements, large opportunities exist for 2018 and beyond

Next Steps

Building On Past Work, HSS Pathways Will Become More Personalized

Past — One pathway per procedure — 12 Pathways

Present — Multiple pathways per Procedure — 35 Pathways

Future — Personalized pathways per Patient — Unlimited Pathways

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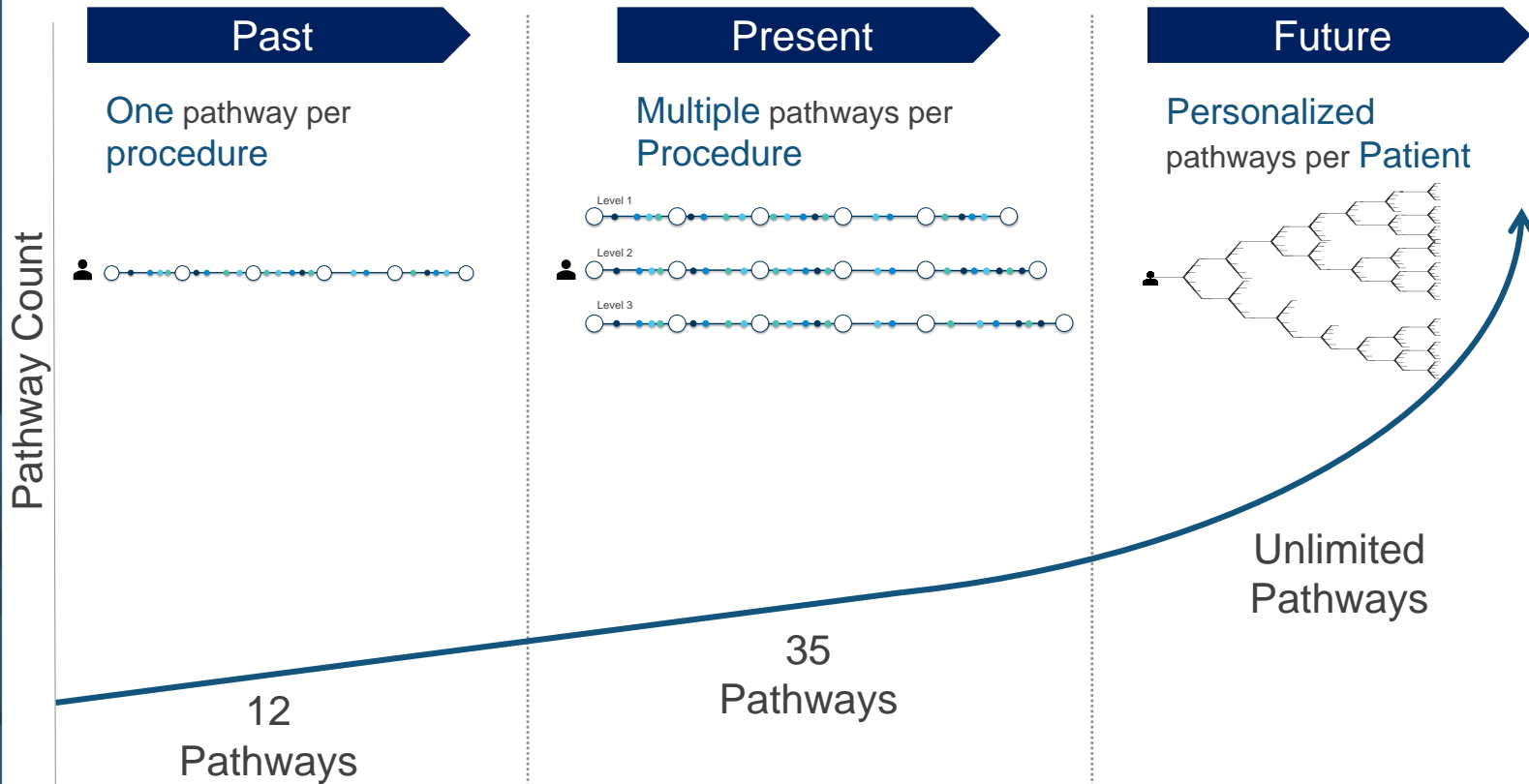
Personalized pathways will require more clinical coordination, flexible operations, and rapid development cycles

#HIMSS19

Soon, Pathway Development Will Be Driven By A Steering Committee

Structure ······························▶ **Process** ······························▶ **Output**

Pathways Steering

- Spine Team
- Knee Team
- Hip Team
- Shoulder Team
- Peds Team
- Foot Team
- Trauma Team
- Other Team

On-Going Support
- Review data
- Review high risk patient cases
- Project management

Prioritization
- Identify highest priority updates
- Ensure alignment to org. Priorities
- Production Sched.

Development
- Dev. cycles
- Build new pathways
- Adjust existing pathways
- Educate staff

- Impact
- Clinical Effectiveness
- Distinct
- Continuous Improvement
- Strategic Alignment
- Consistent
- Communication
- Team Based

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

Appendix 1: Inpatient Pathway Adherence 2016 - 2018

Pathway LOS Adherence By Month, 2016 - 2018