TIME IS NOT REFUNDABLE! OPTIMIZING CARDIAC SURGERY PATIENT THROUGHPUT

Aaron Lamale, MSN, BA, RN, FNP, AGACNP-BC, Cardiothoracic Surgery Advanced Practice Provider[1], Corinne Rosenberg, MMSc, PA-C, Manager of Advanced Practice, Cardiovascular Intensive Care Unit[1], Salma Mansour, MSN, MBA, RN, ACNP-BC, LSSGB, Hospital Operations Center Manager[2], Nathalie Cheng, MS, LSSBB, ASQ CQA, Senior Quality Consultant[3]

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Learning Objectives

- ✓ Apply communication methods to relieve patient congestion from operating rooms to intensive care units.
- ✓ Describe elements of the interactive dashboard that assist with throughput and capacity management
- ✓ Describe a multi-disciplinary approach to addressing patient flow bottlenecks in a surgical service line

Problem Statement

Efficient patient flow and capacity management are essential to the success of any health care organization. The opening of Stanford Health Care's new adult hospital increased operating room (O.R.) capacity, but the cardiac surgery service quickly identified a bottleneck in transferring patients from the O.R. into intensive care unit beds. The need for immediate resolution drove multiple clinical stakeholders to develop an effective patient flow and throughput process.

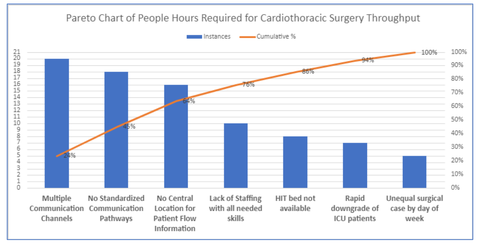

Figure 1: Pareto Chart

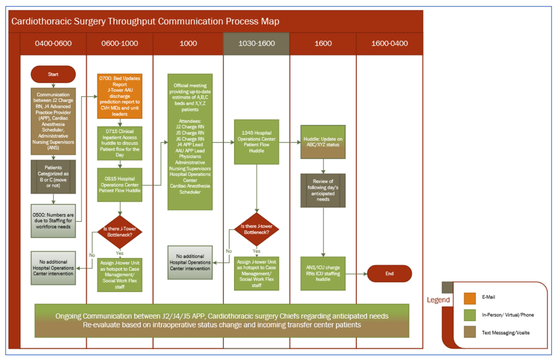

Figure 2: Cardiothoracic Surgery Communication Pathway

Goals

- ✓ Decrease delayed cardiac surgery first case starts 5% (from 15% to 10%).
- ✓ Decrease O.R. bed holds 6% (from 18% to 12%).
- ✓ Reduce the average number of daily Cardiothoracic Surgery throughput communications between involved parties from 180 to 135 (25% decrease).

Changes Implemented

- ✓ Short term changes implemented in the Electronic Health Record (EHR) Unit Manager to allow the multi-disciplinary team to identify incoming and outgoing transfers, while improving timeline accuracy of surgical case closure and patient acuity based on specific cardiovascular parameters and equipment needed.
- ✓ Educating multi-disciplinary teams on utilizing the unit manager to improve patient flow visibility.
- ✓ Long term goal achieved by creating a service line specific dynamic dashboard in the EHR.

A: Open Bed
B: Ready to Transfer
C: Likely ready to transfer by end of shift

X: 1st start case
Y: 2nd start case
Z: Emergency case (i.e., ECMO, Type A, Transplant)

Figure 3: Cardiothoracic Surgery Throughput Nomenclature

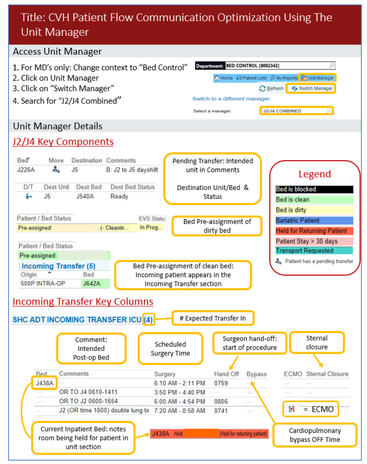

Figure 4: Changes to Unit Manager

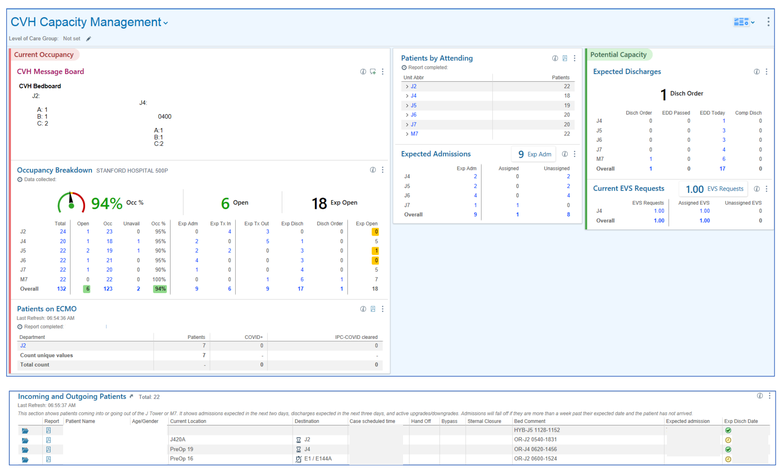

Figure 5: Cardiovascular Health Capacity Dashboard

Outcomes

- ✓ Exceeded goal of reducing delayed cardiac surgery first start cases by 5%, achieving an 8% reduction.
- ✓ O.R. Bed holds decreased 14%, surpassing project goal of a 6% reduction.
- ✓ Realized a 44% reduction in the number of daily J-tower throughput communications, from 180 to 100 - reclaiming an annual 520 hours (target was 25%).
- ✓ Improved multidisciplinary engagement with the patient throughput process, leading to increased team satisfaction and enhanced productivity.
- ✓ Increased visibility and transparency of patient flow data in real time.
- ✓ Throughput capacity improved through deployment of an interactive communication system, including an innovative and interactive patient-level capacity dashboard.

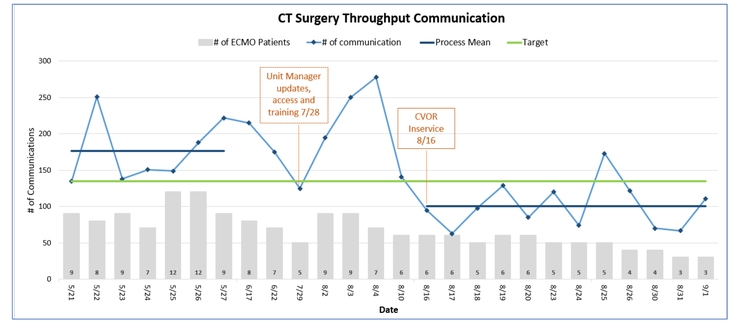

Figure 6: Cardiothoracic Surgery Throughput Communication

Challenges

- ✓ Obtaining communication data was challenging due to various communication modalities and lack of consistent tracking.
- ✓ Frequent modifications and updates needed to upkeep dashboard access and utilization.
- ✓ Security access through the EHR did not allow for inclusive views by the team of the unit manager.
- ✓ Unique service line processes required additional customizations to the standard EHR template.

Sustainability and Future State

- ✓ 15 months after project launch, team upholds interventions averaging 5% and O.R. holds at 10%.
- ✓ Communication practice change has remained and improved through the use of the dashboard.
- ✓ Cardiovascular Health Capacity Management dashboard is used daily during the morning huddle and known to be the source of truth for all cardiovascular service patient flow and throughput.
- ✓ The team is currently exploring Artificial Intelligence/machine learning implementation into the cardiac surgery capacity management dashboard. The addition of a predictive model would assist in occupancy forecast for the next day, improving the ability for early bottleneck intervention even earlier.

Thank You

The success of this project would not have been possible without the collaboration and support of Sri Seshadri, Joseph Woo, Alan Yeung, Charlene Kell, Jake Shepherd, Martin Angst, Jack Boyd, Charles Hill, Maia Bucoy-Duque, Tony Mendez, Richard Quitevis, Anson Lee, Dennis Manzanades, Pauline Regner, Trinie Harris, Emily Holt and ANS Team, Vidya Rao, Jessica Brodt and CT Anesthesia schedulers, Lauren Bianchi, Michael Otlin, Rana Chowdhury, Ted Tang, Makenzie Stanberry, Megan Atashroo, Purnima Krishna.

[1]Department of Cardiothoracic Surgery; [2]Hospital Operations Center; [3]Destination Cardiovascular Service line Quality

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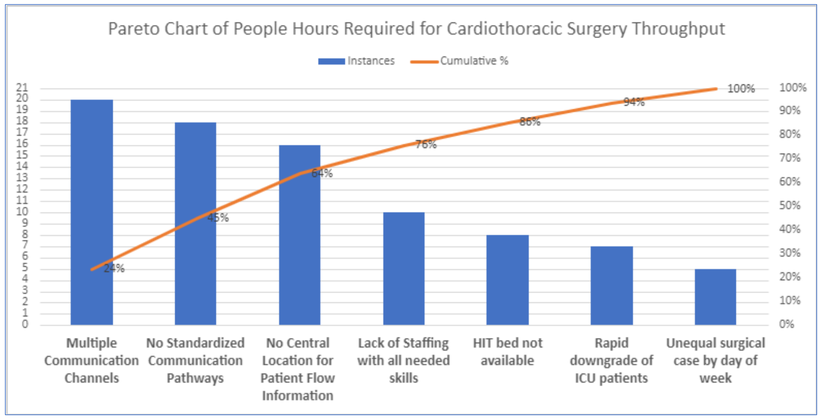
Problem Statement



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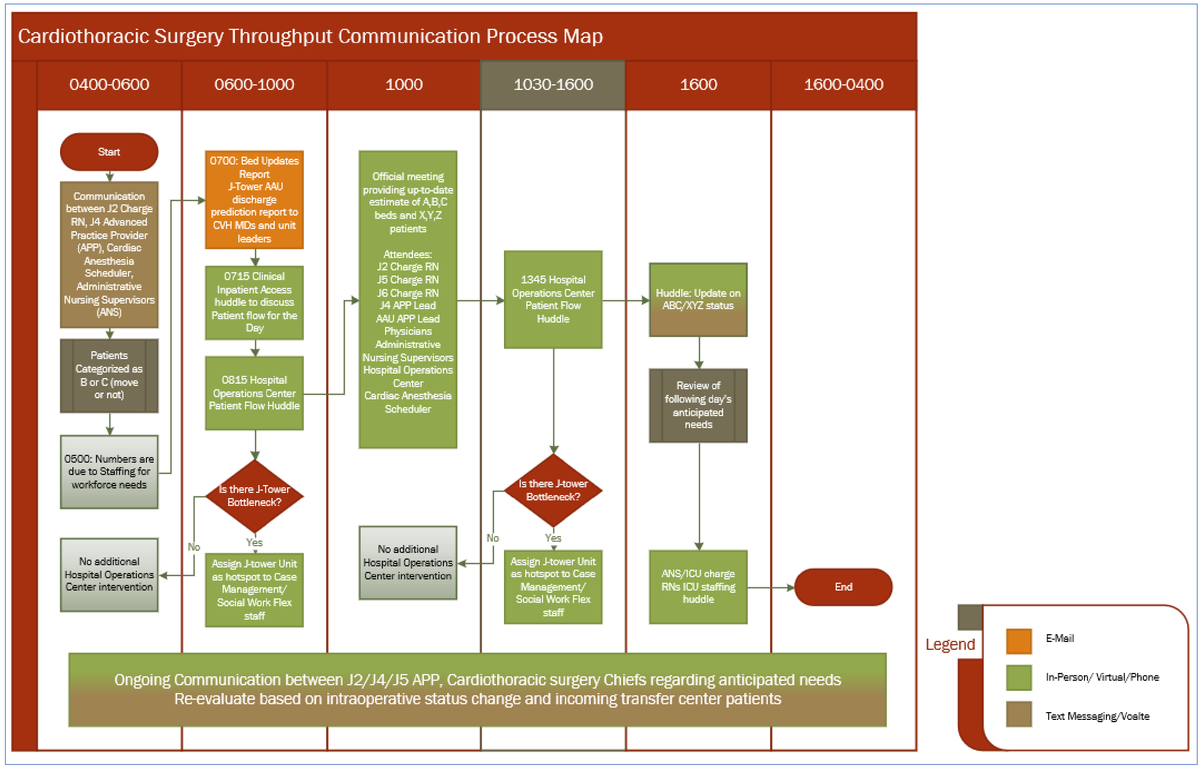


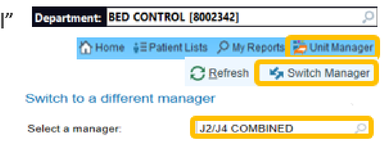
Figure 2: Cardiothoracic Surgery Communication Pathway

Changes Implemented

Title: CVH Patient Flow Communication Optimization Using The Unit Manager

Access Unit Manager

1. For MD's only: Change context to "Bed Control"
2. Click on Unit Manager
3. Click on "Switch Manager"
4. Search for "J2/J4 Combined"



Unit Manager Details

J2/J4 Key Components

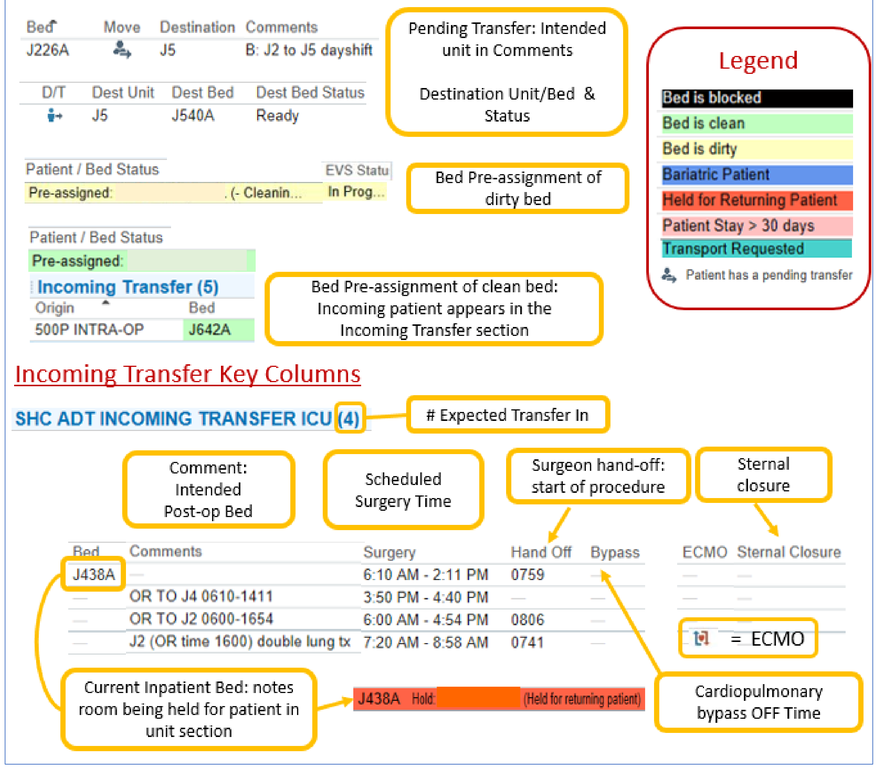


Figure 4: Changes to Unit Manager

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Changes Implemented

CVH Capacity Management

Level of Care Group: Not set

Current Occupancy

CVH Message Board

CVH Bedboard

J2:
A: 1
B: 1
C: 2

J4:
0400
A:1
B:1
C:2

Occupancy Breakdown STANFORD HOSPITAL 500P

Data collected:

94% Occ % | 6 Open | 18 Exp Open

	Total	Open	Occ	Unavail	Occ %	Exp Adm	Exp Tx In	Exp Tx Out	Exp Disch	Disch Order	Exp Open
J2	24	1	23	0	95%	0	4	3	0	0	0
J4	20	1	18	1	95%	2	0	5	1	0	5
J5	22	2	19	1	90%	2	2	0	3	0	1
J6	22	1	21	0	95%	4	0	0	3	0	0
J7	22	1	20	0	90%	1	0	0	4	0	5
M7	22	0	22	0	100%	0	0	1	6	1	7
Overall	132	6	123	2	94%	9	6	9	17	1	18

Patients on ECMO

Last Refresh: 06:54:36 AM

Report completed:

Department	Patients	COVID+	IPC-COVID cleared
J2	7	0	0
Count unique values	7	-	-
Total count	-	0	0

Patients by Attending

Report completed:

Unit Abbr	Patients
J2	22
J4	18
J5	19
J6	20
J7	20
M7	22

Expected Admissions 9 Exp Adm

	Exp Adm	Assigned	Unassigned
J4	2	0	2
J5	2	0	2
J6	4	0	4
J7	1	1	0
Overall	9	1	8

Potential Capacity

Expected Discharges

1 Disch Order

	Disch Order	EDD Passed	EDD Today	Comp Disch
J4	0	0	1	0
J5	0	0	3	0
J6	0	0	3	0
J7	0	0	4	0
M7	1	0	6	0
Overall	1	0	17	0

Current EVS Requests 1.00 EVS Requests

	EVS Requests	Assigned EVS	Unassigned EVS
J4	1.00	1.00	0
Overall	1.00	1.00	0

Incoming and Outgoing Patients Total: 22

Last Refresh: 06:55:37 AM

This section shows patients coming into or going out of the J Tower or M7. It shows admissions expected in the next two days, discharges expected in the next three days, and active upgrades/downgrades. Admissions will fall off if they are more than a week past their expected date and the patient has not arrived.

Report	Patient Name	Age/Gender	Current Location	Destination	Case scheduled time	Hand Off	Bypass	Sternal Closure	Bed Comment	Expected admission	Exp Disch Date
									HYB-J5 1128-1152		
			J420A	J2					OR-J2 0540-1831		
			PreOp 19	J4					OR-J4 0620-1456		
			PreOp 16	E1 / E144A					OR-J2 0600-1524		

Transfer Center Patients Total: 7

Last Refresh: 06:56:37 AM

This section shows patients being considered in Transfer Center for the CVH service. These patients may also appear in the above component if their bed request is already assigned to a CVH unit.

Report	Patient Name/Age/Gender	SHC Admitting Diagnosis	Current Location	Level of Care	Service	Principal Accepting Provider	Referring Location	Bed Comments
			Waitlist	Acute Care (Assessment or intervention q4-8)	Cardiology			
			Waitlist	Critical Care	Cardiac Surgery			
		s/p esophagectomy anastamosis leak	Waitlist	Acute Care (Assessment or intervention q4-8)	Thoracic Surgery			TC: MS COVID +

Figure 5: Cardiovascular Health Capacity Dashboard

Outcomes

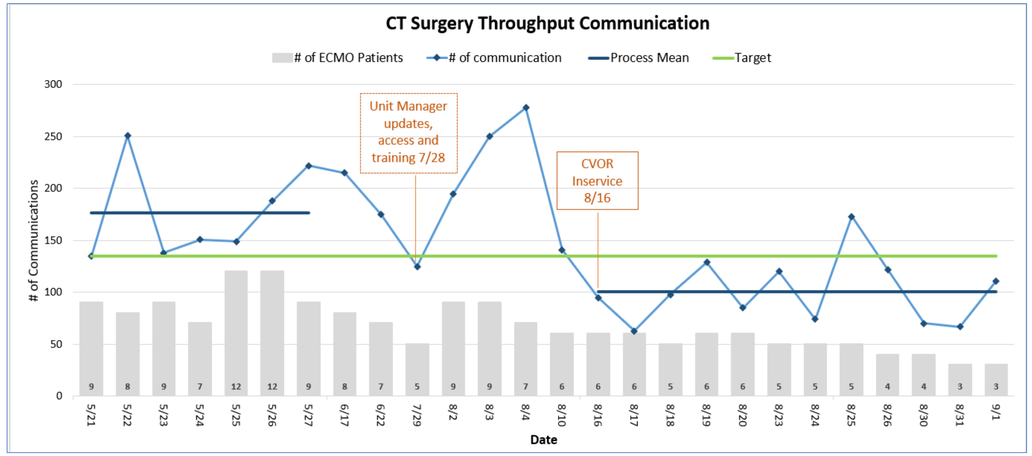

Figure 6: Cardiothoracic Surgery Throughput Communication

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